March, 1946

THE FOUNDRY

wherever metals are cast...

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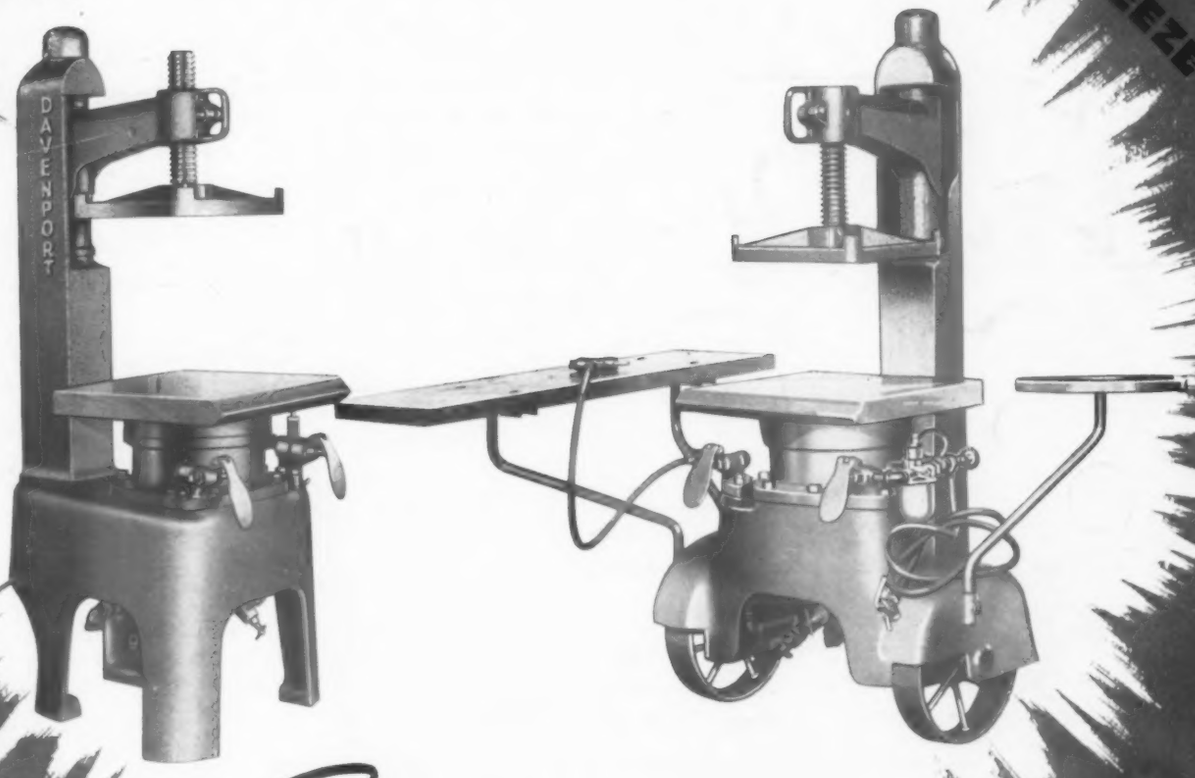
Announcing THE NEW MODERN DAVENPORT JOLT SQUEEZE



Saves MAN HOURS

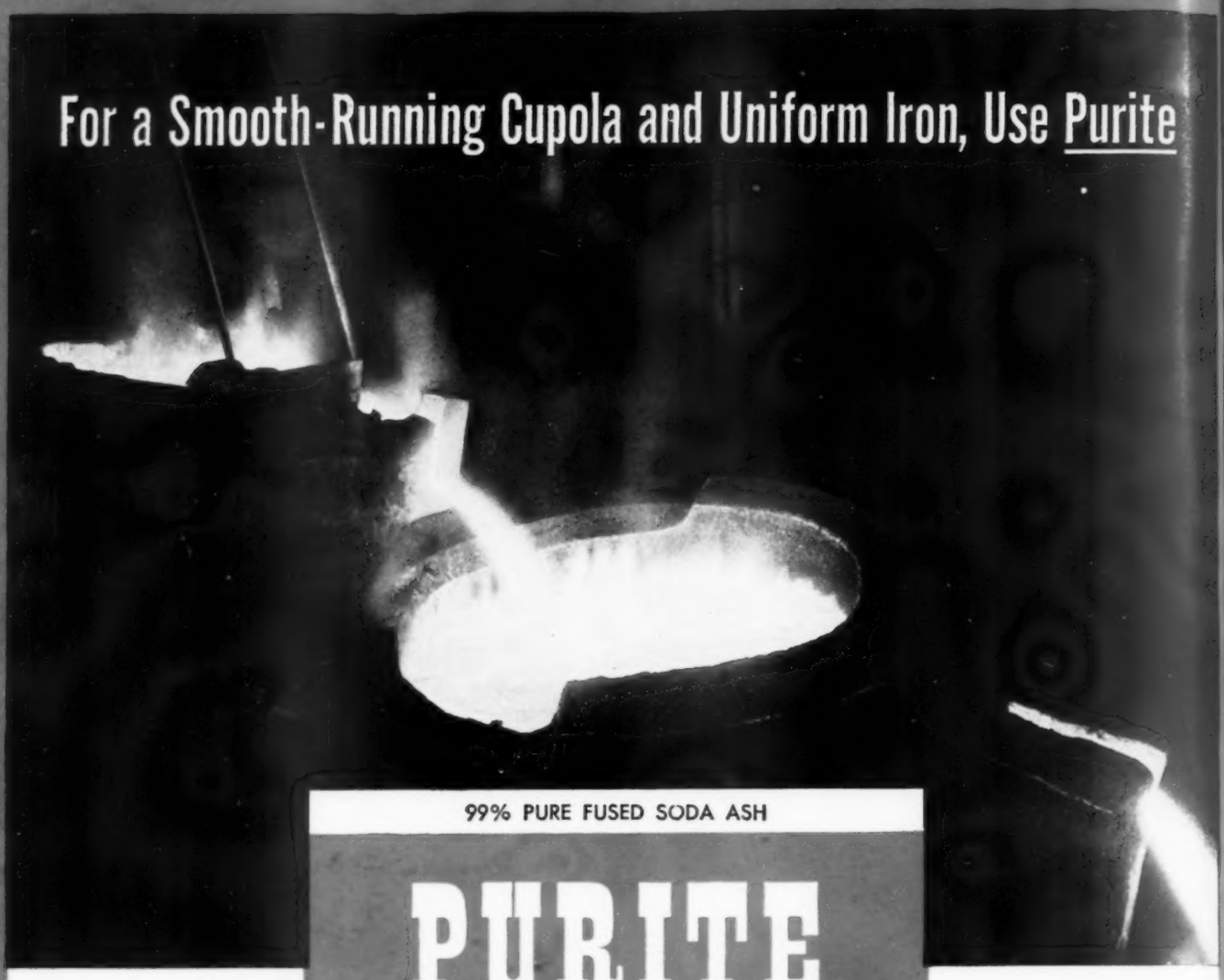
Davenport Molding Machines with many unique and exclusive features are saving man hours in the foundries of America by producing quality castings in less time at lower cost.

Let us send you information.

DAVENPORT MACHINE AND *Foundry Company*

DAVENPORT, IOWA U.S.A.

For a Smooth-Running Cupola and Uniform Iron, Use Purite



99% PURE FUSED SODA ASH

PURITE

The Scientific Flux for Better Melting and Cleaner Iron

A smooth-operating cupola, from the start to the finish of the heat, is the first essential in maintaining uniform iron in the mass production of specification castings.

Purite—in the cupola hearth or in the ladle—helps smooth out variations in the molten metal. By accelerating combustion reactions, Purite restricts the combustion zone to a smaller, hotter area over the tuyeres; it prevents bridging and reduces oxidation of the metal charge. Purite makes a refining slag which purges the molten iron of sulfur, oxides and silicates and thus helps to improve machinability and to reduce shrinkage and segregation defects.

Purite has been used for over 20 years in helping to make sounder and better castings. Can you afford to overlook this inexpensive means of improving your castings?

Our advice is always available—to help you improve your cupola practice and make better castings with Purite.

THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42nd STREET, NEW YORK 17, N. Y.
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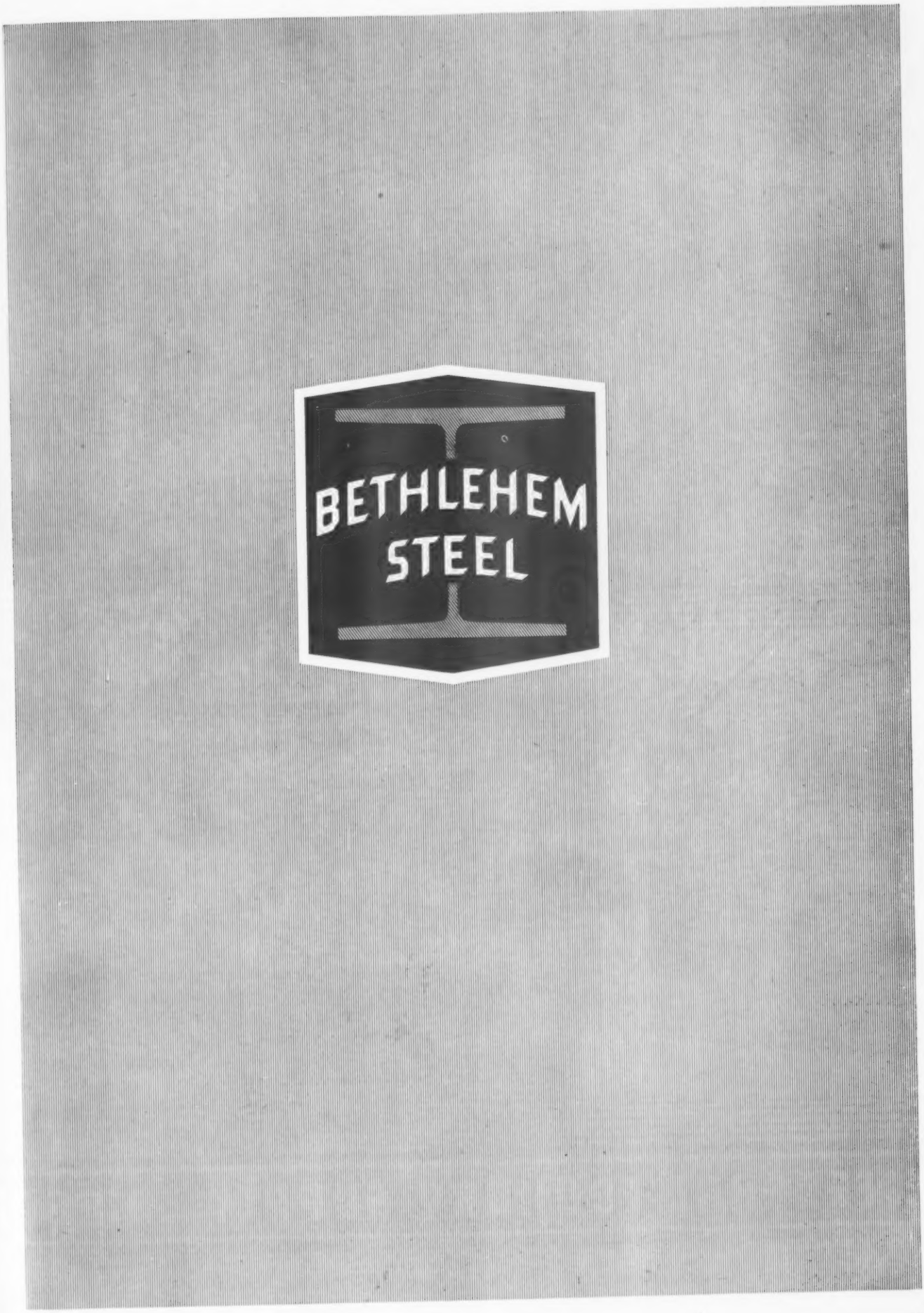
Mathieson
CHEMICALS

Purite (Fused Soda Ash) . . . Chlorine Dioxide . . . Caustic Soda . . . Soda Ash . . . Bicarbonate of Soda . . . Ammonia, Anhydrous & Aqua . . . Sodium Chlorite Products . . . Liquid Chlorine . . . HTH Products . . . Synthetic Salt Cake . . . Dry Ice . . . Carbonic Gas . . . Sodium Methylate


BETHLEHEM
STEEL

WHAT HAPPENED PROFESSOR?

I DIDN'T USE THE RIGHT MIX!

IN FOUNDRY PRACTICE, AS WELL AS IN CHEMISTRY, THE WRONG MIX FREQUENTLY SPELLS TROUBLE—IN FOUNDRIES ALL OVER THE COUNTRY THE RIGHT MIX SPELLS...

GREEN BOND

When we repeat, over and over that FEDERAL GREEN BOND is the best of the Bentonites, we base our claim on these facts: GREEN BOND gives a constant, never-changing mix, whether it's a handful, a shovelful or a carload. It may be mixed to make a durable mold, or it may be applied to produce an easily collapsing sand that runs freely. Because GREEN BOND controls sand strength, it is the basis for economical production.

THE FEDERAL FOUNDRY SUPPLY COMPAN

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THE FOUNDRY

for MARCH 1946

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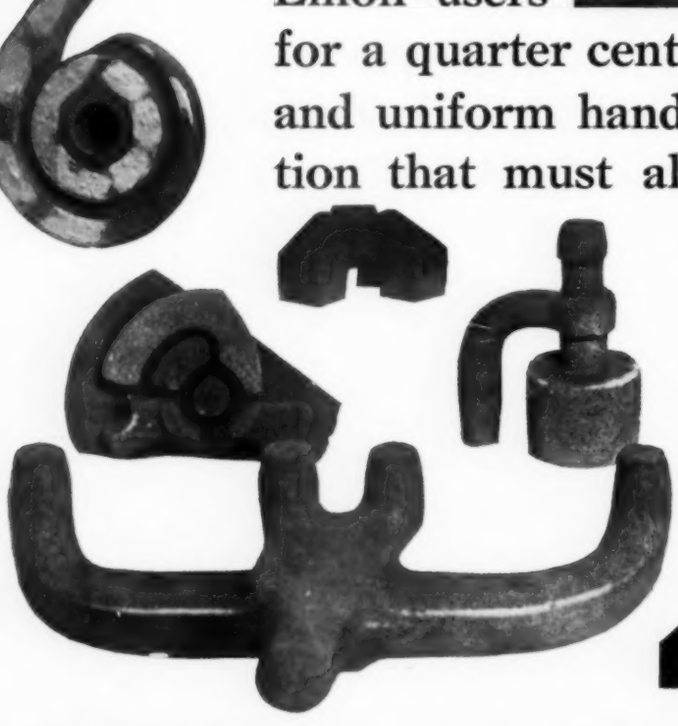
CORE TROUBLE

NOT IN YEARS HE SAYS

"I suppose we must have had core trouble the same a most foundries, but it was so long ago we do not remem ber. Uniform, high grade sand and uniform, high grad oil are our insurance against core trouble. It works." S says Jack Cole, Plant Manager of Plant B of The Fores City Foundries Company, Cleveland, Ohio. Both Plant and the Walworth Plant, have been Linoil users for a quarter century. Uniform sand, uniform o and uniform handling are an unbeatable combina tion that must always result in uniform cores

LINOIL

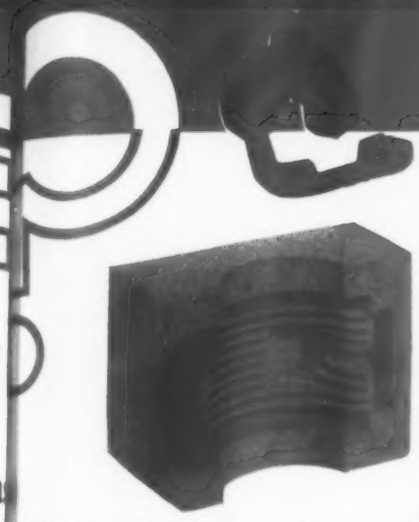
Uniform cores and absence o core trouble are possible i every foundry. Tr the Forest Cit plan for results



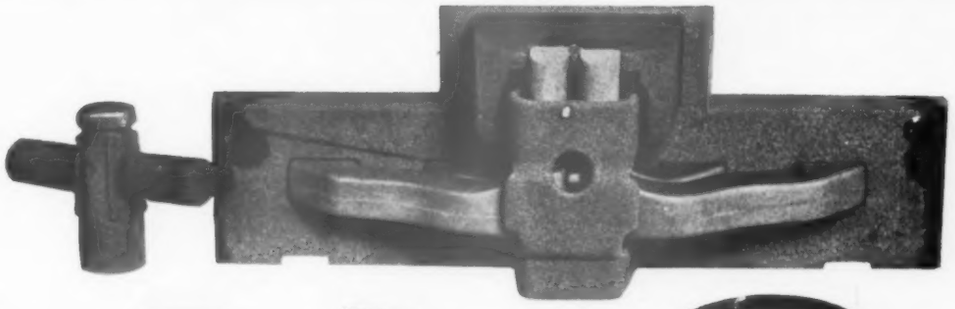
THE WERNER G.

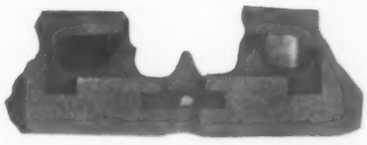
(DIVISION OF ARCHER-

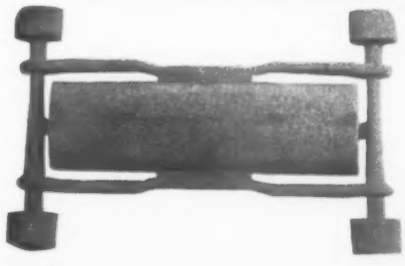
2191 WEST 110 STREET WOODBINE



Michael Butcher, as he stood before the camera, was the foreman of the core room. Two days later he was Foundry Superintendent Michael Butcher. Mike, like all the Forest City boys, is strong for Werner G. Smith oil. He knows from personal experience that Linoil is a powerful binder taking high sand ratios. He knows Linoil is a quick even drier giving cores as evenly baked in the centers as on the surfaces. He knows that comparatively little gas is generated in the molds and that core gas blown castings are few and far between. He knows contraction of the casting is nothing to worry about so far as the cores are concerned because the Linoil cores are completely collapsible. He knows that the cleaning room is never a bottleneck threat in Forest City because the burned cores are shaken out cleanly and castings whiz through the cleaning room as fast as they are brought in from the casting floor. He knows that as long as he continues to have right sand, right oil and right core room procedure he is going to be free from a raft of problems that beset some superintendents.







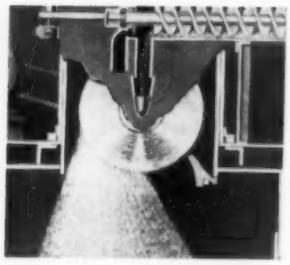
Uniformity of Linoil . . . well known as the name . . . Backwards or forward Linoil spells UNIFORMITY

SMITH COMPANY

DANIELS - MIDLAND COMPANY)

4690 CLEVELAND 2, OHIO

Bombardment shatters cost



# of cleaning

Blast Cleaning with ROTOBLAST* Reduces Costs 50-80%

Pangborn ROTOBLAST Cleans Car Wheels quicker, at lower cost, for:

American Car & Foundry Co.
Chicago, St. Louis, Huntington, W. Va.

American Brake Shoe & Foundry Company
Houston, Texas, Rochester, N. Y.

Mt. Vernon Car Company
Mt. Vernon, Ill.

Maryland Car Wheel Company
Baltimore, Maryland

Canadian Pacific Railroad
Montreal

In addition to saving in man-power, the Pangborn ROTOBLAST Unit also assures:

1—Saving in time

2—Saving in breakage

3—Uniformly cleaned castings — silver bright

4—Faster machining

5—Less "sand and scale" wear on cutting tools

6—Simplified inspection

Blast Cleaning with ROTOBLAST Reduces Machine Operating Cost

Those firms which have installed Pangborn Airless ROTOBLAST Cleaning Units (barrels, tables and special machines) benefit from Pangborn developments which provide lower costs for operation and maintenance.

Cost of abrasives is less because of an improved method of feeding onto rotating vanes without the crushing which is inherent with the old combination of revolving impeller and stationary control cage.

Maintenance cost is less because vane replacement — a major item of maintenance — is accomplished easily, just by removing a pin, in contrast to loosening threaded parts which

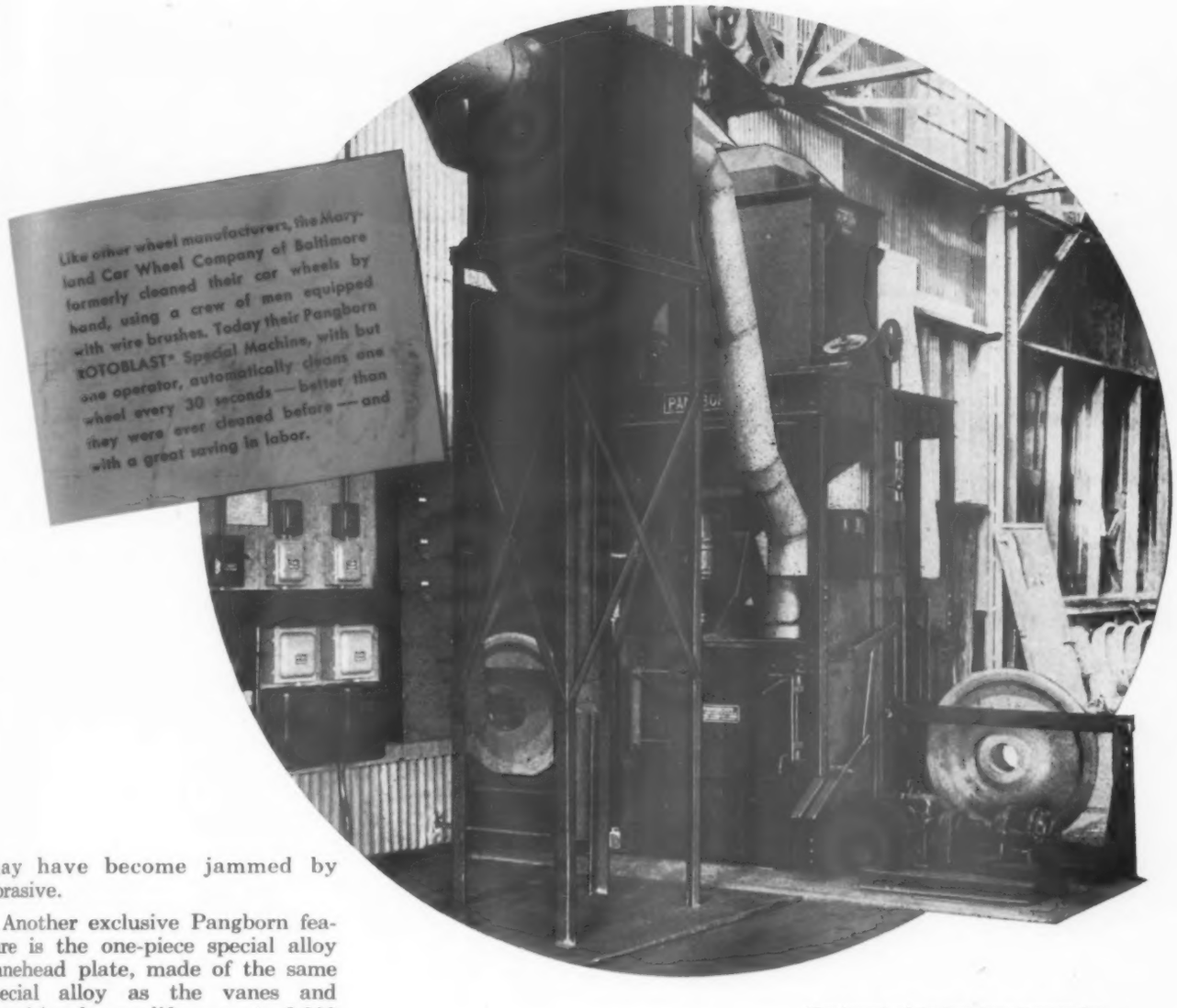
1500-Hour Guarantee Often Exceeded

Pangborn-Norbide† Air Blast Nozzles, guaranteed for 1500 hours service with steel abrasive, have given in actual use as much as 2000 hours before replacement.

Such a service bonus is typical of Pangborn-Norbide nozzles, made with a liner that is the strongest, hardest, most abrasive-resisting substance ever made for commercial use. It reduces air consumption 10–20% compared with iron nozzles, and improves blasting efficiency by maintaining stream contour and abrasive velocity.

†Trademark of Norton Co. for Boron Carbide

NO OTHER NOZZLE WILL OUT-PERFORM A PANGBORN-NORBIDE


Like other wheel manufacturers, the Maryland Car Wheel Company of Baltimore formerly cleaned their car wheels by hand, using a crew of men equipped with wire brushes. Today their Pangborn ROTOBLAST* Special Machine, with but one operator, automatically cleans one wheel every 30 seconds — better than they were ever cleaned before — and with a great saving in labor.

may have become jammed by abrasive.

Another exclusive Pangborn feature is the one-piece special alloy vanehead plate, made of the same special alloy as the vanes and promising longer life — up to 3,000 hours depending on the work and the type of abrasive.

Complete information on ROTOBLAST is available by requesting bulletins on ROTOBLAST Rocker Barrels, Tables and Special Machines. Address Pangborn Corporation, Hagerstown, Maryland, *world's largest manufacturer of blast cleaning and dust control equipment.*

*Trademark of the Pangborn Corporation

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

Pangborn's "DD-4" shoulder-rest Helmet helps men do more work — with less "time out" — because it is the easiest-wearing air-fed helmet made.

Extra-large vision window. Sliding guard. Soft sponge rubber shoulder pads. Ample room inside — does not touch the head, permits wearing glasses. Quickly detachable. Approved by U. S. Bureau of Mines.

Pangborn also offers economical "DF-2" — rubber covered cork headpiece, adjustable head-band. Pangborn Corporation, Hagerstown, Maryland.

Latest Information on Economical Blast Cleaning
Pangborn Corporation, Hagerstown, Maryland

Gentlemen: Please send me free bulletin checked:

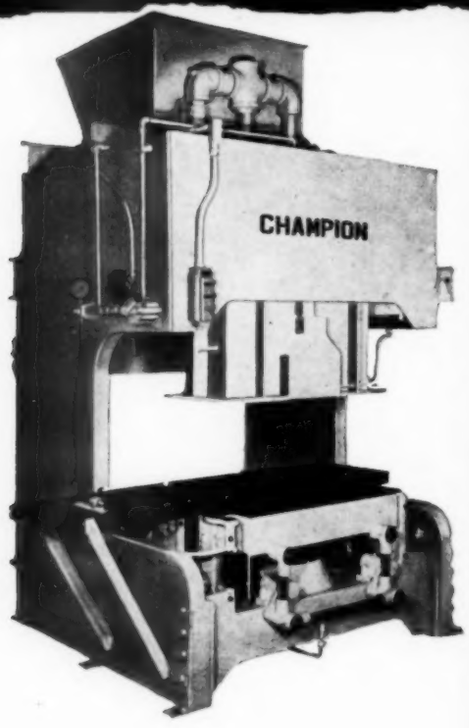
ROTOBLAST Barrels, No. 213 ☐ ROTOBLAST Special Machines, No. 2120 ☐ ROTOBLAST Tables, No. 211 ☐ Air Blast Rooms, No. 400 ☐

Name ..... Title .....

Company .....

Address .....

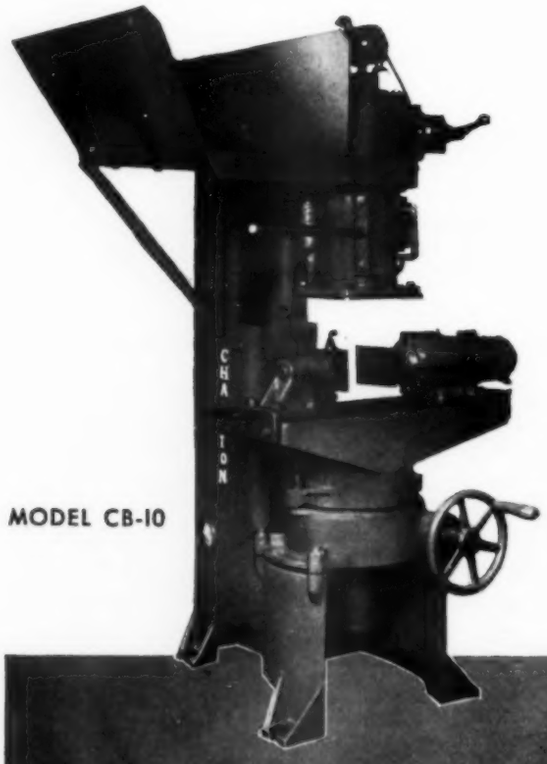
FOUR GREAT



MODEL CB-400

American Eagle

Chinese Dragon



MODEL CB-10

Champions in any endeavour always have that extra bit of something that the sports writer calls "moxie" and the man on the street calls "guts."

That's what the United Nations had and the enemy had not. That's what makes the winner.

And that's what has made *Champion* Core Blowers great—experience of the designers—built-in stamina and simplicity of operation.

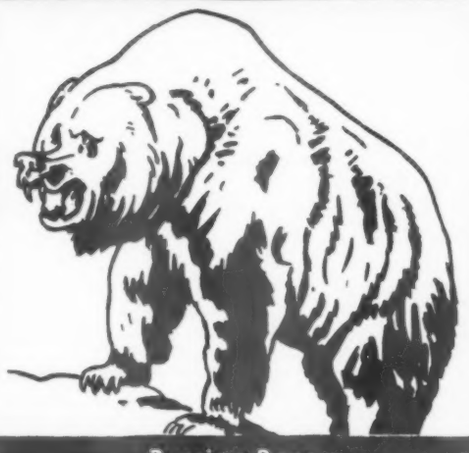
Any man or woman without previous experience can

CHAMPION Foundry

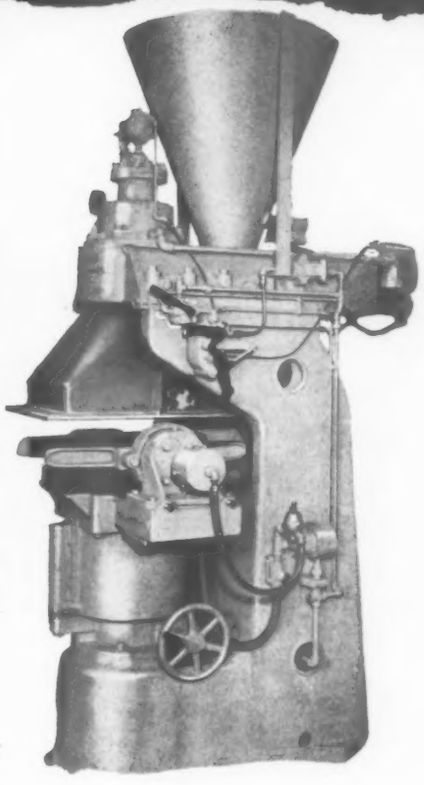
1318 WEST 21st STREET

CHAMPIONS

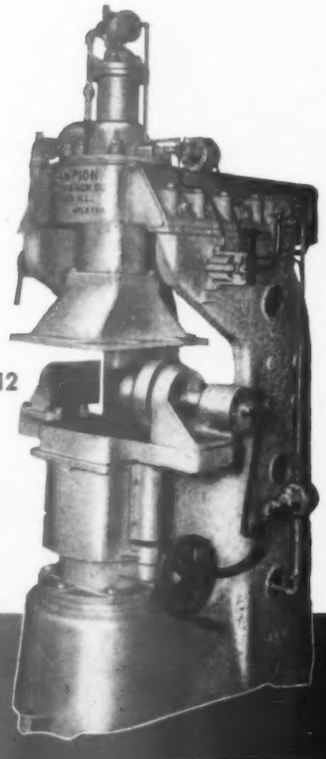
British Bull Dog



Russian Bear



MODEL CB-15



MODEL CB-12

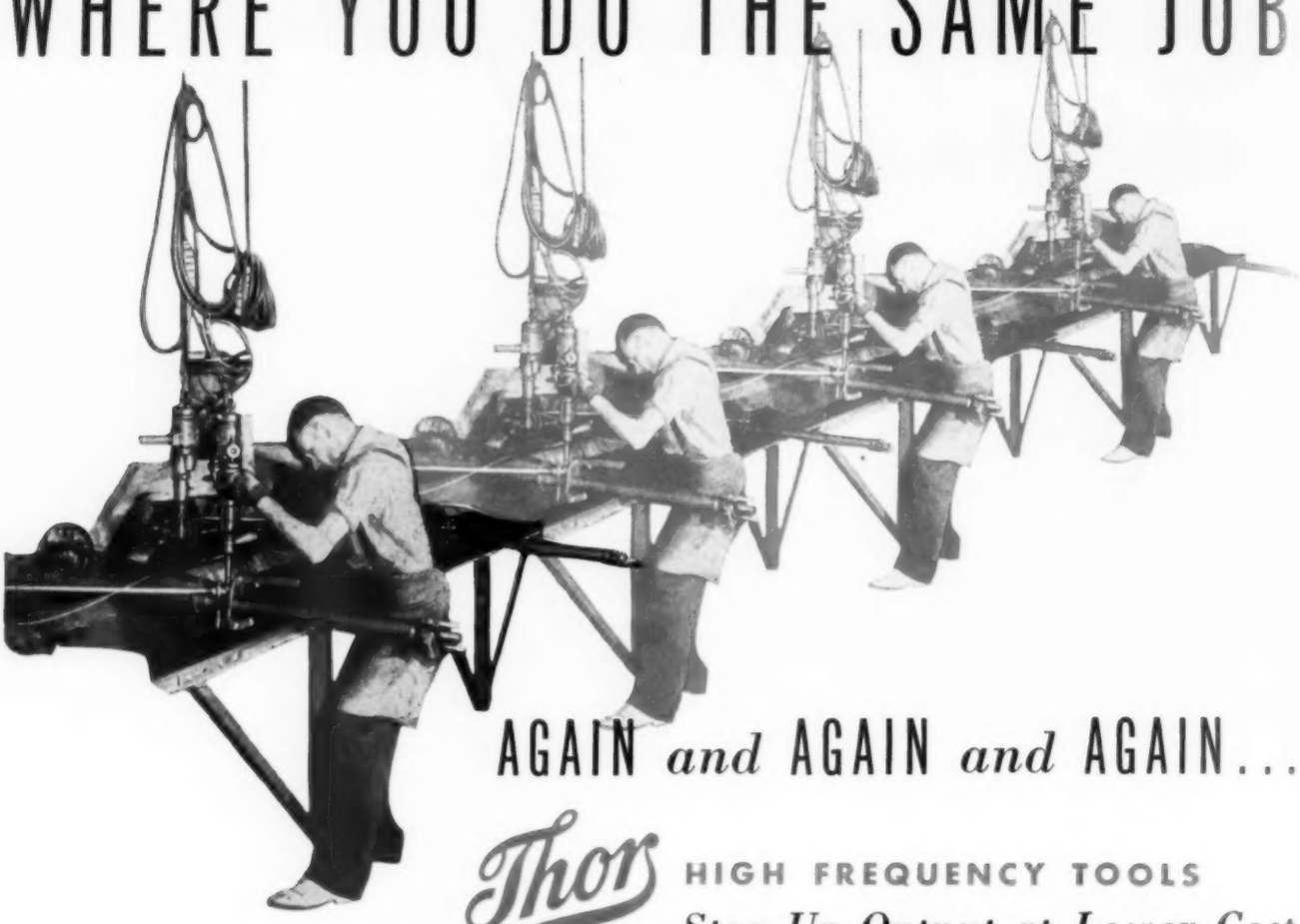
produce perfectly rammed cores on a *Champion.* You simply set the box and pull the lever. A single valve operates the core box clamp, clamps same against the blow plate, blows the core, exhausts and releases the clamp in the proper cycle. Regardless of size or design—small or large, simple or complex cores—the ramming time is identical.

Now that keener competition threatens, why gamble on any core blower other than a *Champion.*

and Machine Company

CHICAGO 37, ILLINOIS

WHERE YOU DO THE SAME JOB



AGAIN *and* AGAIN *and* AGAIN...

Thor HIGH FREQUENCY TOOLS

Step Up Output at Lower Cost

Operating on 180 cycle current, Thor High-Frequency Electric tools maintain virtually *constant speed* under load; have *more power* per pound; are light, compact and *easier to handle*. These characteristics provide extra efficiency for increased production with less cost. Running at unvarying, full-rated speed, the tools deliver greater work and power output in relation to power input . . . reducing operating cost. Maintenance costs are lower, too, because Thor high-frequency tools are made with fewer motor parts—all extremely simple and subject to little wear.

Generally, these benefits are realized *most* on mass production operations. If you use a total of ten or more tools—for drilling, reaming or tapping; grinding, sanding or polishing; screw driving or nut setting—a Thor engineer can show you how Thor High-Frequency Electric Tools will *pay* you on every job. Call your nearby Thor branch.

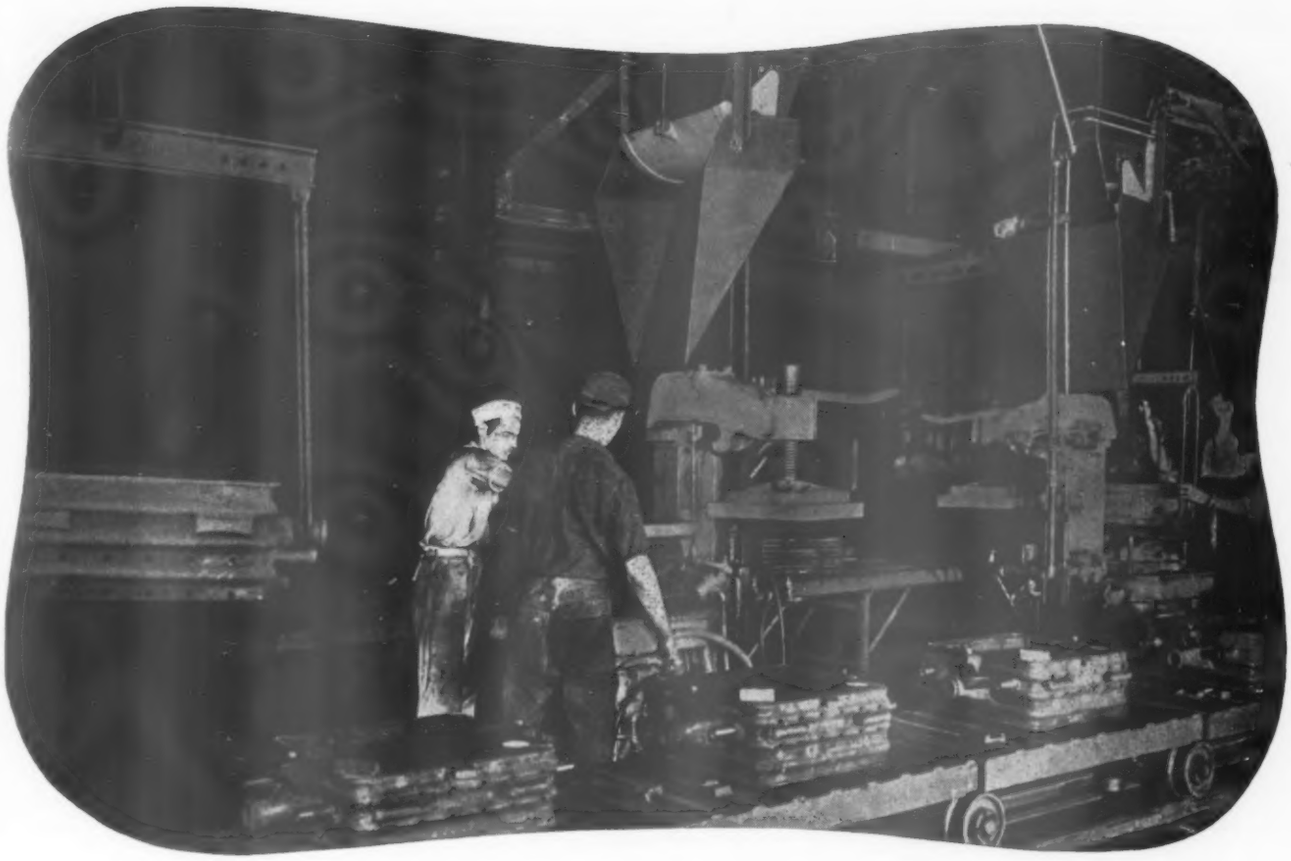
INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. Jackson Boulevard, Chicago 6, Illinois

BIRMINGHAM BOSTON BUFFALO CLEVELAND DETROIT LOS ANGELES MILWAUKEE NEW YORK
PHILADELPHIA PITTSBURGH ST. LOUIS SALT LAKE CITY SAN FRANCISCO TORONTO, CANADA LONDON, ENGLAND

Thor PORTABLE POWER **TOOLS**

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS



Eliminate Back and Head Aches

Save your men the tiring, tedious work of lifting, bending, shoveling with Bartlett-Snow foundry equipment,—and you'll reduce your own headaches too. Individually engineered to your particular and individual requirements, based on our long and successful experience in this work, a Bartlett-Snow installation will give you a maximum of both quantity and quality from your plant. Costs go down. Your product finds readier sale. The workmen get larger take home pay—easier—like their jobs better. Absenteeism and turnover are much reduced. And the smoother, more even, more continuous production means bigger profits, larger dividends for you. Can we send you more details?

Bulletin No. 91
sent on request

THE C. O. BARTLETT & SNOW CO.

6201 HARVARD AVENUE • CLEVELAND 5, OHIO

ENGINEERING REPRESENTATIVES IN THE PRINCIPAL CITIES

FOUNDRY SAND, MOLD AND CASTINGS HANDLING

SAVE
EXTRA HANDLING!

USE CMD *DUAL-PURPOSE CORE TRAYS*

The CMD Dual-Purpose Core Tray can be used for baking the cores, thus eliminating transfer of cores from core plate to core tray.

Because of their lock-stacking features, these trays make possible storage from the floor up. Bins and racks are no longer necessary.

SPECIFICATIONS

SIZE—12" X 24"

LOADING HEIGHT—4½"—6" OR 7"

OVERALL HEIGHT—5½"—7" OR 8"

WEIGHT—9½ POUNDS

MATERIAL—16 GA. SHEET METAL

SPOT WELDED (28 POINTS)

ALL ROUNDED CORNERS

2 BOTTOM REINFORCEMENT ANGLES

CONSTRUCTED FOR STACKING

CHICAGO MANUFACTURING & DISTRIBUTING CO.

Dept. 5F, 1928 West 46th St. CMD • • Chicago 9, Illinois

Now Available

TO EVERY FOUNDRY

MINCO BOND

ARE YOU GETTING PEAK CASTING PRODUCTION PER MAN HOUR?

If you have good green strength, only, in your sand, you are getting castings, it is true, but you must have HIGH FLOWABILITY, GREEN STRENGTH, and HIGH COLLAPSIBILITY in your molding sand, to really get PEAK CASTING PRODUCTION PER MAN HOUR.

You cannot attain full, PEAK CASTING PRODUCTION PER MAN HOUR, if any single one of the above mentioned qualities is lacking in your molding sand.

In order to get full, PEAK CASTING PRODUCTION PER MAN HOUR:

1st. The sand must flow promptly, with not an instant's delay, thru the chutes and hoppers into the molding machines, no matter what high green strength is used; where a minimum jarring and squeeze attains a maximum and uniform mold hardness. This is FLOWABILITY, and, no matter at what high range of green strength the sand is carried, this free flowing action must be fully attained at all times or PEAK CASTING PRODUCTION PER MAN HOUR will not be materialized.

2nd. Enough GREEN STRENGTH must be used to make the mold rapidly, and strong enough to stand handling before pouring. If enough GREEN STRENGTH is not used, PEAK CASTING PRODUCTION PER MAN HOUR cannot be accomplished, because of losses due to drops, broken corners of mold, difficulties in making the lift, etc. etc. The use of MINCO BOND allows the foundry to use any high range of GREEN STRENGTH desired and adds HIGH FLOWABILITY as well, and attains PEAK CASTING PRODUCTION PER MAN HOUR.

3rd. After the castings are poured they should shake out of the sand free and clean and with minimum time and effort in the cleaning room. After the sand has been shaken free of the casting, the sand should be free of lumps and in condition to be quickly rebonded and mulled. A foundry sand without COLLAPSIBILITY creates a bottle neck in the shake out and cleaning room. MINCO BOND adds HIGH COLLAPSIBILITY to your molding sand and enables you to get PEAK CASTING PRODUCTION PER MAN HOUR.

We repeat you may be producing castings, but you cannot attain PEAK CASTING PRODUCTION PER MAN HOUR without the use of MINCO BOND, because MINCO BOND is the only mineral bond known to foundry science today, which has all three essentials necessary for PEAK CASTING PRODUCTION PER MAN HOUR.

MINCO BOND has EXCEPTIONALLY HIGH FLOWABILITY, GOOD GREEN STRENGTH and EXCEPTIONALLY HIGH COLLAPSIBILITY. It makes the best molding sand possible to attain.

Below are the PHYSICAL QUALITIES of MINCO BOND. In no other mineral bond in the foundry world can you purchase so much intrinsic value for your dollar.

1. HIGH FLOWABILITY which increases production.
2. GOOD GREEN STRENGTH.
3. HIGH COLLAPSIBILITY which increases flow of castings thru cleaning equipment (reduces shake out and cleaning costs).
4. HIGH DRY STRENGTH.
5. LOW HOT STRENGTH AT POURING TEMPERATURES (eliminates cracked castings).
6. HIGH DURABILITY (which still further reduces costs).
7. NO EXPANSION AND NO CONTRACTION AT ROOM TEMPERATURES.
8. The use of MINCO BOND SLOWLY INCREASES PERMEABILITY and
9. INHIBITS THERMITE REACTION which eliminates casting blows.
10. REDUCES SCRAP LOSSES due to sand failure.
11. MAKES SMOOTHER CASTINGS.
12. A NEUTRAL MINERAL, having a pH of 7.5 (will not foul up heaps or systems when in continuous use).

Let us prove to you the statements we make regarding MINCO BOND.

MINCO BOND IS SOLD WITH SERVICE AND GUARANTEED.

Write for our booklet.

MINCO PRODUCTS CORPORATION

SAGINAW, MICHIGAN

WARNER R. THOMPSON CO.
7328 Hamilton Ave., Detroit, Mich.

THE BUCKEYE PRODUCTS CO.
7020-34 Vine St., Cincinnati, Ohio

MARTHENS COMPANY
1205 4th Ave., Moline, Ill.

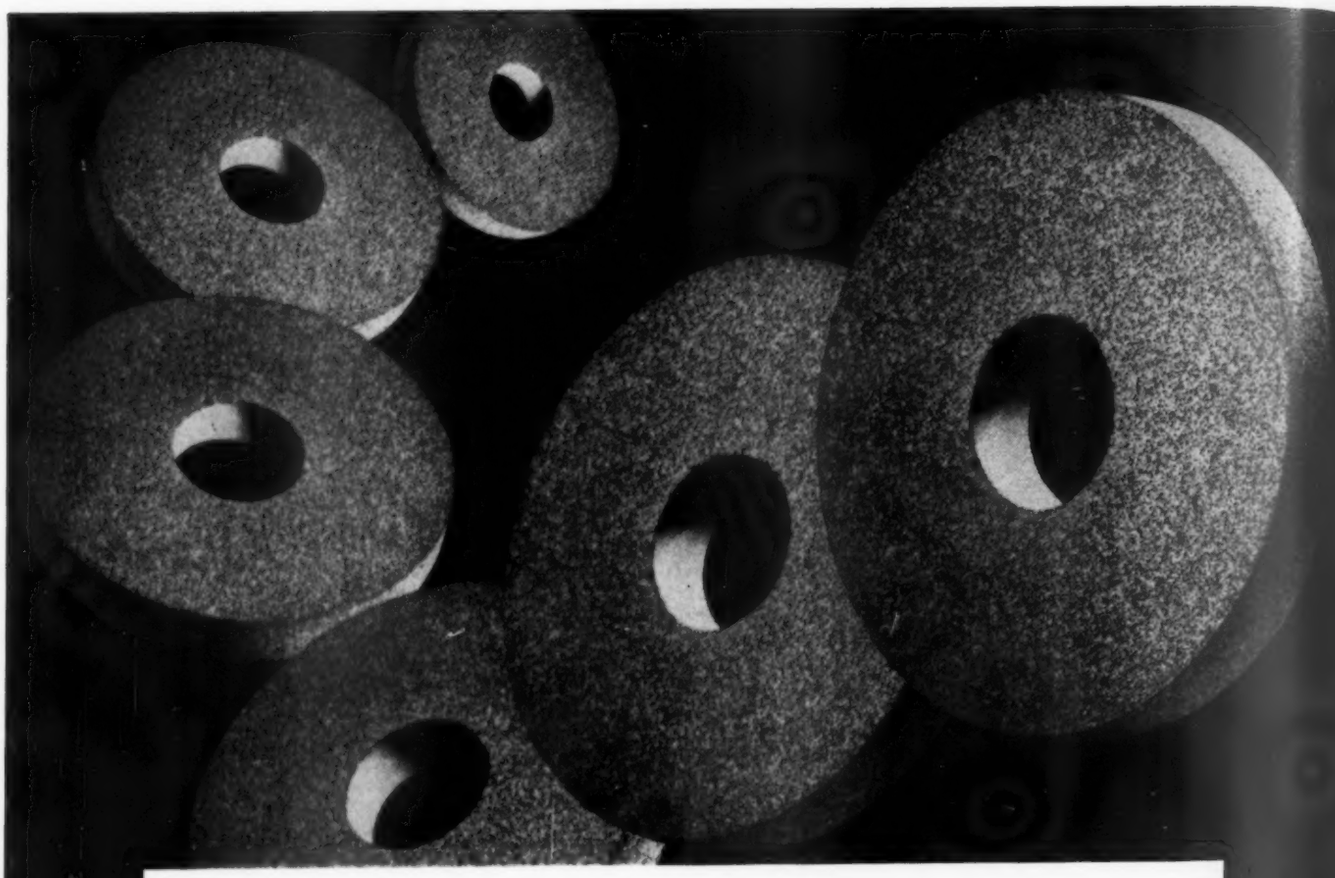
FOUNDRY SUPPLIES CO.
461 W. 33rd St., Chicago, Ill.

HOFFMAN FOUNDRY SUPPLY CO.
1193 Main, Cleveland, Ohio

WM. R. BARNES COMPANY, Lt.
243 Cumberland Ave., Hamilton, Ont.

WOLVERINE FOUNDRY SUPPLY CO.
3211 Bellevue, Detroit, Mich.

SHANAHAN'S LIMITED, Vancouver, British Columbia · SHANAHAN'S LIMITED, Winnipeg, Manitoba
INDUSTRIAL FOUNDRY SUPPLY CO., Inc., San Francisco, Calif.



Meeting individual requirements
on every count

When you order grinding wheels from Peninsular you can be sure they will fit your requirements because *they're made to fit.*

Every wheel that Peninsular makes is especially *engineered* to the individual problems of the job on which it will be used —*designed* and *processed* to meet those problems on every count.

That's why so many manufacturers with difficult grinding jobs are turning to Peninsular grinding wheels.

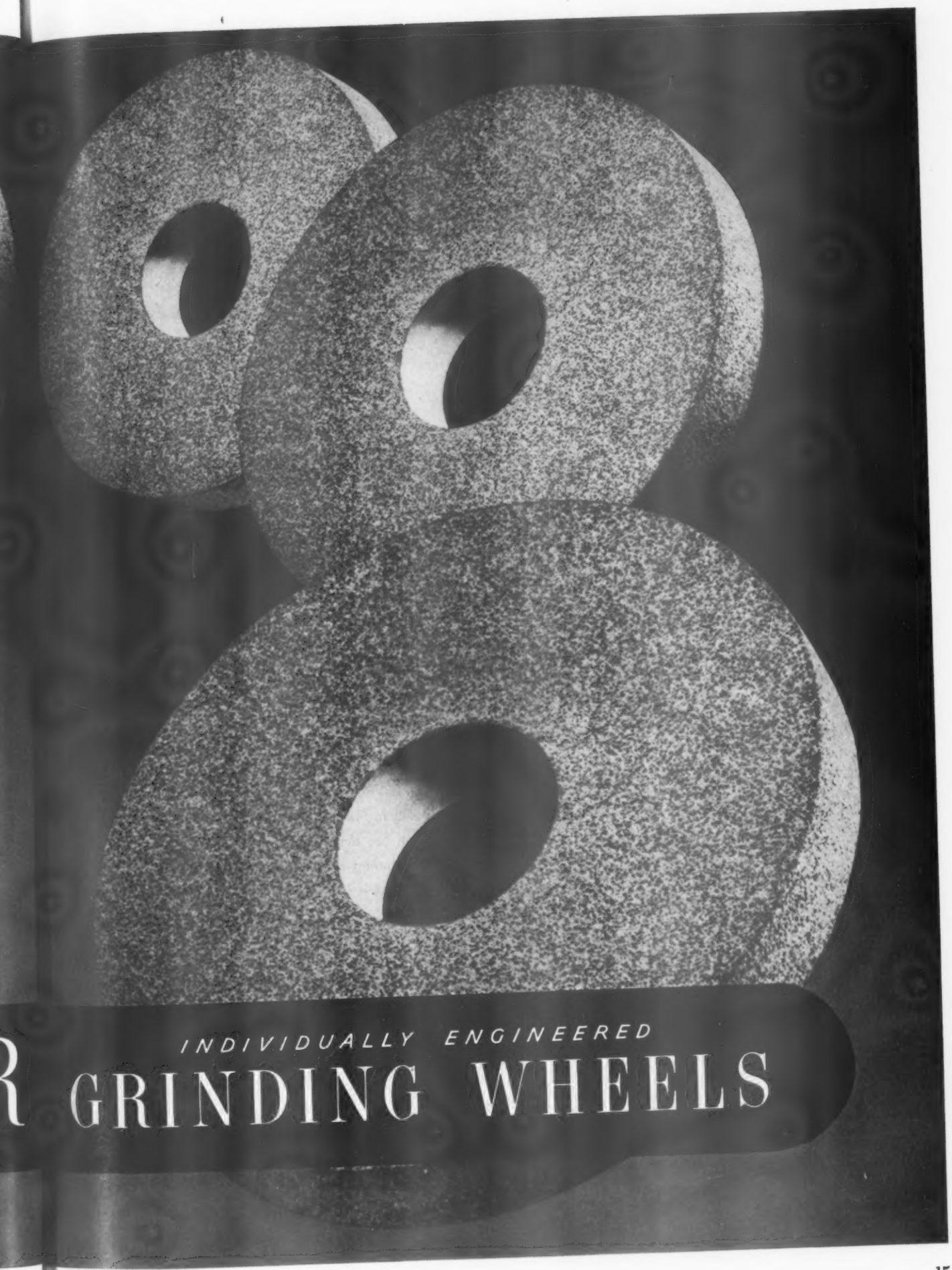
Peninsular factory and field engineers have a production, engineering and cost analysis service beyond any offered up to now in the industry. We'll stake our reputation that they can help you—no matter how difficult your grinding problems may be!

The Peninsular Grinding Wheel Company, 729 Meldrum Ave., Detroit 7. Sales Offices: Chicago, Philadelphia, Cleveland, Newark, Pittsburgh, Houston, St. Louis.

PENINSULAR

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS


INDIVIDUALLY ENGINEERED
GRINDING WHEELS

"SPECIAL ISSUES

Offer many

INCREASED READER INTEREST • GREATER ADVERTISING VALUE

• The Foundry for May

The "Pre-Convention Issue"

Editorial plans for this outstanding issue already well along, assure readers all over the world of an all-time record in the production of any publication devoted to a single industry. All the features of any regular issue of The FOUNDRY will be there—PLUS the greatest presentation of advance convention news ever assembled.

The May Pre-Convention Issue of The FOUNDRY will be in the hands of readers well in advance of the opening of the show with a complete preview of this great 50th Annual Foundry Convention.

To all those who sell to the foundry industry, whether supplies, accessories or equipment, the May Pre-Convention issue of The FOUNDRY offers the one outstanding opportunity to present a special message to all foundrymen, coupled with an invitation to visit the displays at the convention.

The reservation of advertising space in the May Pre-Convention Issue of The FOUNDRY may be made and copy furnished from now until April 1st, 1946.

COME TO THE 50th ANNUAL F

THE FOUNDRY

A Penton Publication

PENTON BUILDING CLEVELAND 13, OHIO

OF THE FOUNDRY

added features

• The Foundry for June

The "Post-Convention Issue"

Perhaps too few people realize that the lasting value of any convention and display is the record made of it and the thinking on the part of those who attended—AFTER THEY RETURN HOME! The Post-Convention Issue of The FOUNDRY is designed to help all who attend the convention do just that and to provide a reference record to which they may refer for anything of particular interest seen at the show. These will all be ADDED features; the regular interesting foundry articles appearing in their usual places as they do throughout the year.

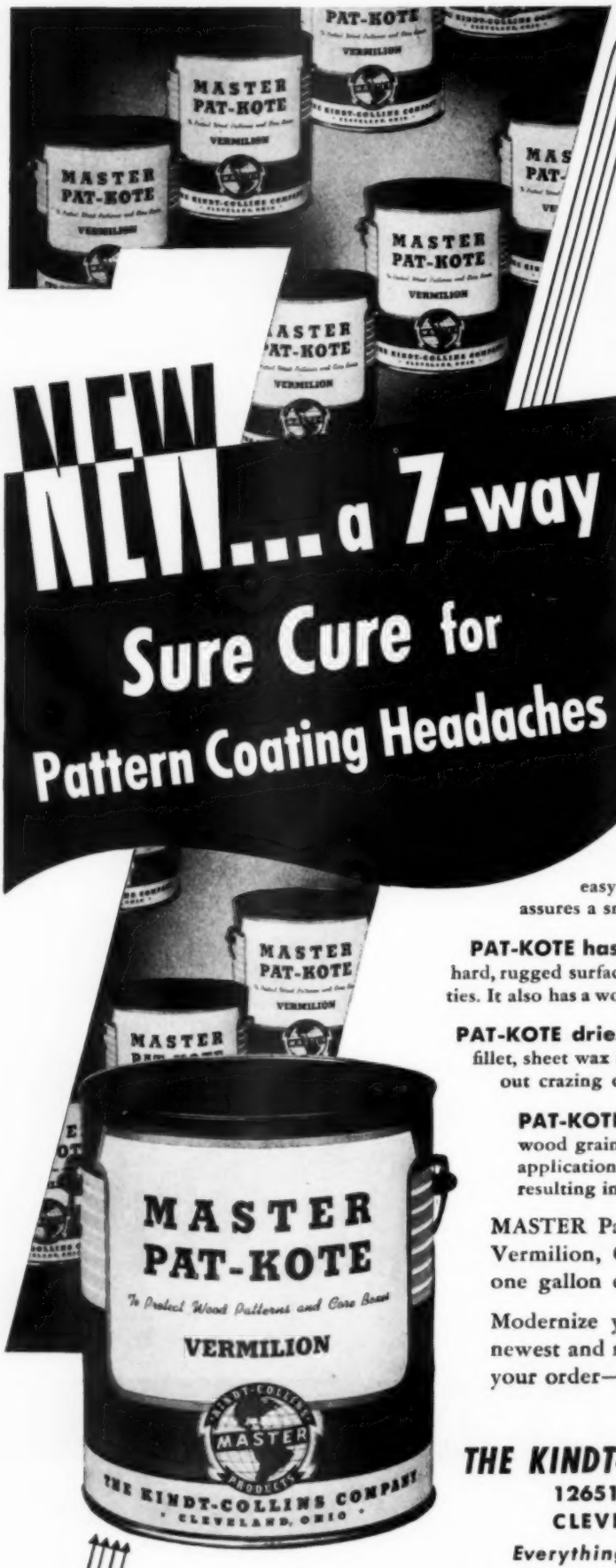
As an advertising medium to carry a special message to all who attended the convention, The June Post-Convention Issue of The FOUNDRY must not be overlooked. It puts your products "on record" as a part of the only printed history of the foundry industry in existence in the world.

AND REMEMBER—thousands and thousands of regular readers of The FOUNDRY do not get the opportunity to attend the conventions. To them these two special issues of The FOUNDRY is the convention itself!

The reservation of advertising space in the June Post-Convention Issue of The FOUNDRY may be made and copy furnished until May 10th, 1946.

AL FOUNDRY CONVENTION....

CLEVELAND PUBLIC HALL
MAY 6-7-8-9-10, 1946



NEW... a 7-way Sure Cure for Pattern Coating Headaches!

Wartime research and experience now have made possible a pattern coating even better than our prewar MASTER Pat-Kote...for many years recognized as the most outstanding product of its kind on the market! This new Kindt-Collins achievement is another step forward in the advancement of fine pattern making.

PAT-KOTE will not stick in sand. Pat-Kote will not blister or soften under the most extreme practical conditions in the foundry. No sticking—smooth, trouble-free performance on the biggest or smallest jobs—a better quality of work every day.

PAT-KOTE is waterproof and oil-proof. Pat-Kote assures increased life for your patterns—stops moisture from getting into glue joints—greatly reduces swelling and warping. An important factor when patterns are in sand for several days. Pat-Kote resists the penetration of core oils under the most severe shop conditions, thereby protecting the pattern, both from the standpoint of life and accuracy.

PAT-KOTE eliminates sanding between coats. Speeds up production time—assures deeper, more durable and protective coating.

PAT-KOTE is self-leveling. Pat-Kote is very easy to apply—does not require any special skill—and assures a smooth, all-covering coat which dries hard quickly.

PAT-KOTE has high wear-resistance. Pat-Kote forms a very hard, rugged surface that gives unusual sand abrasion resisting qualities. It also has a wood-hardening effect to the depth of its penetration.

PAT-KOTE dries over oil and wax. Pat-Kote dries over wax fillet, sheet wax and oil surfaces just as readily as over wood, without crazing or peeling. This is an important factor in storage.

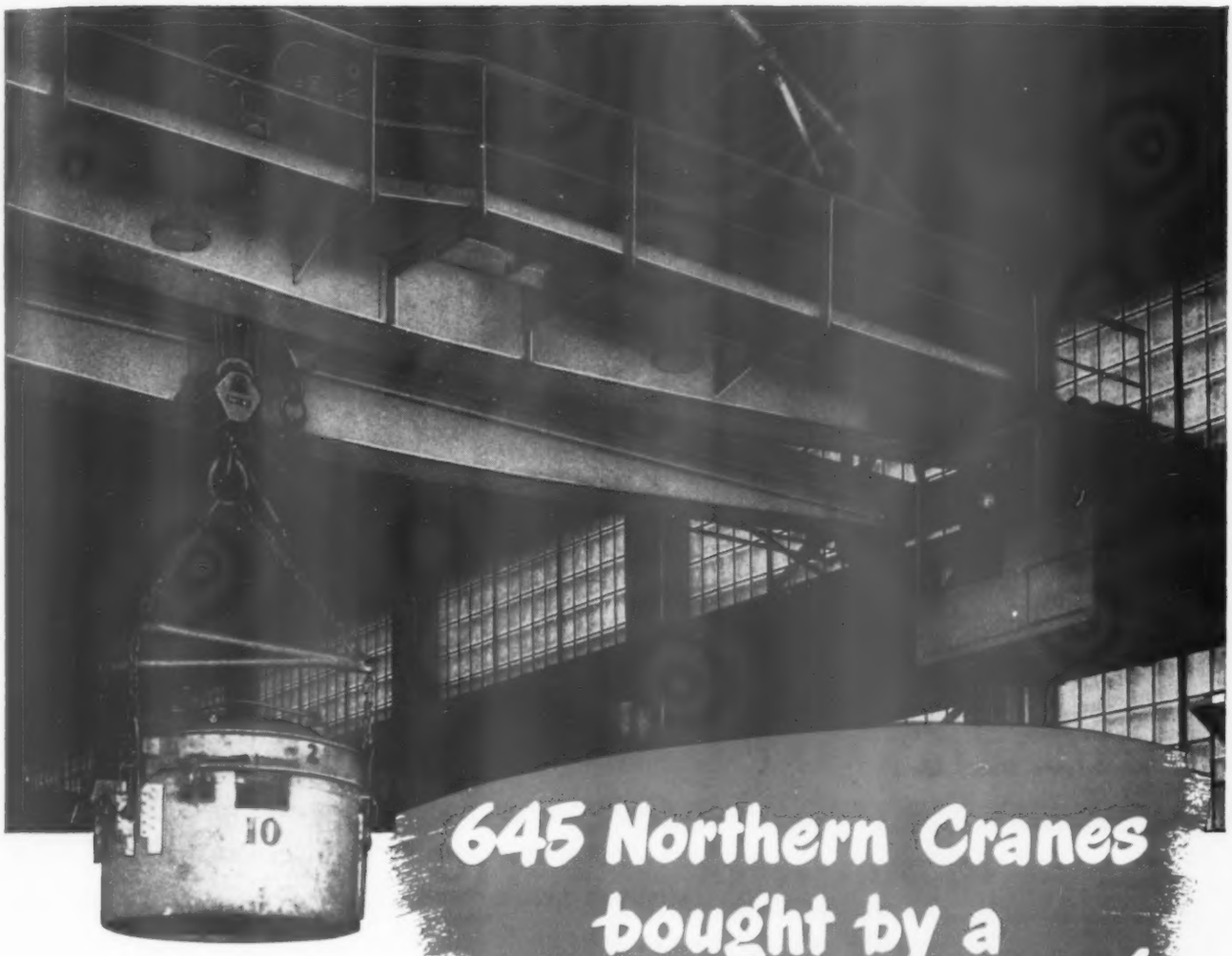
PAT-KOTE does not raise grain. Pat-Kote will not swell wood grain and cause surface irregularities. This permits the application of the desired number of coats without sanding, resulting in a much stronger, smoother final finish.

MASTER Pat-Kote is available in Clear, Clear Orange, Vermilion, Chrome Yellow, Black and Aluminum, in one gallon cans. Other colors available on quotation.

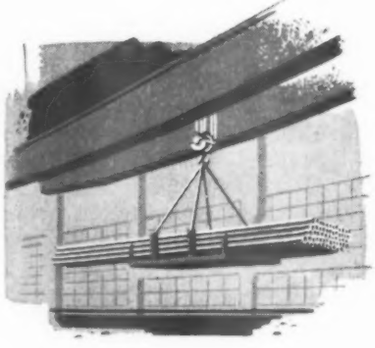
Modernize your pattern coating procedure with this newest and most efficient of all pattern coatings—send in your order—we can ship immediately from fresh stock.

THE KINDT-COLLINS COMPANY
12651 Elmwood Avenue
CLEVELAND 11, OHIO
Everything for the Pattern Shop

KINDT-COLLINS MASTER PRODUCTS



645 Northern Cranes bought by a SINGLE Customer!



Placing scores of repeat orders over a period of years, one large company has bought a total of 645 Northern Cranes.

Only one conclusion can be drawn from this continuous repeat business—Northern produces cranes which give lasting satisfaction.

These orders have included cranes of every type—capacities 5 to 75 tons—and for every sort of service from powerhouse cranes to heavy duty high speed mill cranes.

This is the largest number of cranes we have sold any one customer; but many companies regularly place repeat orders for Northern Cranes and have large numbers of them in operation.

There is a Northern Crane to meet *your* needs. Write for Bulletin 1 712.

WRITE FOR BULLETIN

NORTHERN ENGINEERING WORKS

2615 ATWATER STREET, DETROIT 7, MICHIGAN

Offices in Principal Cities

GLASS SHELLAC POT

- Tough and Durable—Will stand very rough usage
- ¼" Replaceable Wood Dowel Wiping Bar
- Capacity—approx. 1½ quarts
- Height Overall (Pot and cap) 11 inches
- Keeps your shellac clean
- Packed one in carton

Price Each $3.25

FREEMAN DOWMETAL

5/16"-3/8"-1/2"-5/8"-3/4"-1" Thick

●

ONE DAY DELIVERY . . . ORDER BY FLASK SIZE
IF SQUARE GIVE OVERALL SIZE

●

SEND for special Dowmetal Pattern Plate pamphlet showing sizes and prices. Made in any size or style and shipped the same day order is received. We are listing prices of a few of the thousand sizes we can furnish from stock.

FLASK SIZE	THICKNESS 5/16"	3/8"	1/2"
10 x 12	$4.10	$4.90	$ 6.55
11 x 14	4.90	5.90	7.85
12 x 14	5.30	6.35	8.45
12 x 18	6.30	7.55	10.10
13 x 14	5.65	6.80	9.10
13 x 17	6.50	7.80	10.35
14 x 14	6.05	7.25	9.65
14 x 20	7.80	9.35	12.45
15 x 15	6.75	8.10	10.80

FLASK SIZE	THICKNESS 3/8"	1/2"	5/8"	3/4"	1"
16 x 16	$ 8.95	$11.95	$18.25	$21.75	$29.25
17 x 17	9.85	13.15	20.00	24.00	32.25
18 x 18	10.80	14.40	22.00	26.50	35.50
20 x 20	12.85	17.10	26.25	31.50	41.85
22 x 22	15.00	20.00	30.75	36.75	49.00
24 x 24	17.50	23.25	35.50	42.75	56.75
26 x 26	20.00	26.50	40.75	49.00	65.00
28 x 28	22.75	30.25	46.25	55.50	74.00
30 x 40	32.50	43.25	66.25	79.50	106.00

WE ALLOW 1" FOR FLASK AND 2½" ON EACH END FOR PINS AND EARS

The Freeman Supply Company

Pattern Shop & Foundry Supplies & Equipment

Mahogany and Pine Pattern Lumber

1152 East Broadway TOLEDO 5, OHIO Tel. TAylor 4624

HEAT TREAT DEPARTMENT MAKES 1 SQ. FT. FLOOR SPACE DO WORK OF 4

48" x 48" Super-Cyclone Normalizes 200 Tons Per Month

Cramped for floor space in your heat treating department? Need more flexibility, quicker heats? Production records over 12 months in mid-western foundry show Lindberg Super-Cyclone makes 1 sq. ft. of floor space do work of 4 sq. ft.,—produces four 5000-lb. normalizing heats per 24 hour day, and helps speed shipments of castings.

The 48" dia. x 48" deep Super-Cyclone installation occupies area of 20′ x 20′, or 400 sq. ft. This includes furnace, insulated cooling pit, quench tank, and basket loading space, as shown in layout above. A conventional car type furnace in same plant requires total space 51′ x 30′, or 1530 sq. ft.,—almost 4 times that needed for Super-Cyclone.

Plant records show Super-Cyclone normalizes average of 200 tons per month,—the same tonnage as the large car type furnace, so if you are short of space in your heat treating department, check Super-Cyclone production against your present equipment.

Its smaller heats provided flexibility. Production Manager of this foundry says: "The Super-Cyclone saves a lot of space. We ship castings quicker because they come from the furnace quicker. In the Super-Cyclone we turn out a little over four heats a day. Our car bottom turns out 1½ heats a day. The Super helps keep production moving, and customers satisfied."

LINDBERG ENGINEERING COMPANY
2453 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

LINDBERG FURNACES

SUPER-CYCLONE for hardening, normalizing, annealing, tempering
CYCLONE for accurate, low-cost tempering and nitriding
HYDRYZING for scale-free and decarb-free hardening

THE *Jack Rabbit*

No. 401-C
Portable Jolt
Squeeze

Again Johnston-Jennings leads the field,— with this newly designed Jolt Squeeze machine, having a one-piece cast steel squeeze frame operated automatically by air. This construction minimizes operator fatigue and assures better, less costly and faster production, even with semi-skilled labor.

A single valve controls all operations. Only two bearings are used in the squeeze frame, thus eliminating wear and assuring a uniform, even squeeze to all parts of the mold.

The newly designed squeeze head equipped with rubber guards to protect the patterns, can be easily adjusted for different height flasks, and three large wheels permit the machine to be moved quickly over uneven floors. Can we send you a completely descriptive catalog?

A COMPLETE LINE PROVEN IN SERVICE INCLUDING—

PLAIN AIR JOLTS
in 12 different sizes

JOLT SQUEEZERS
fast sturdy machines—3 sizes

JOLT STRIPPING PLATES
4 sizes ranging up to 16" draw

JOLT, SQUEEZE, STRIPPING PLATE AND PATTERN DRAWS
Popular for medium service —2 sizes

PORTABLE JOLT ROLL-OVER AND PATTERN DRAW
A heavy duty thoroughly dependable machine—portable

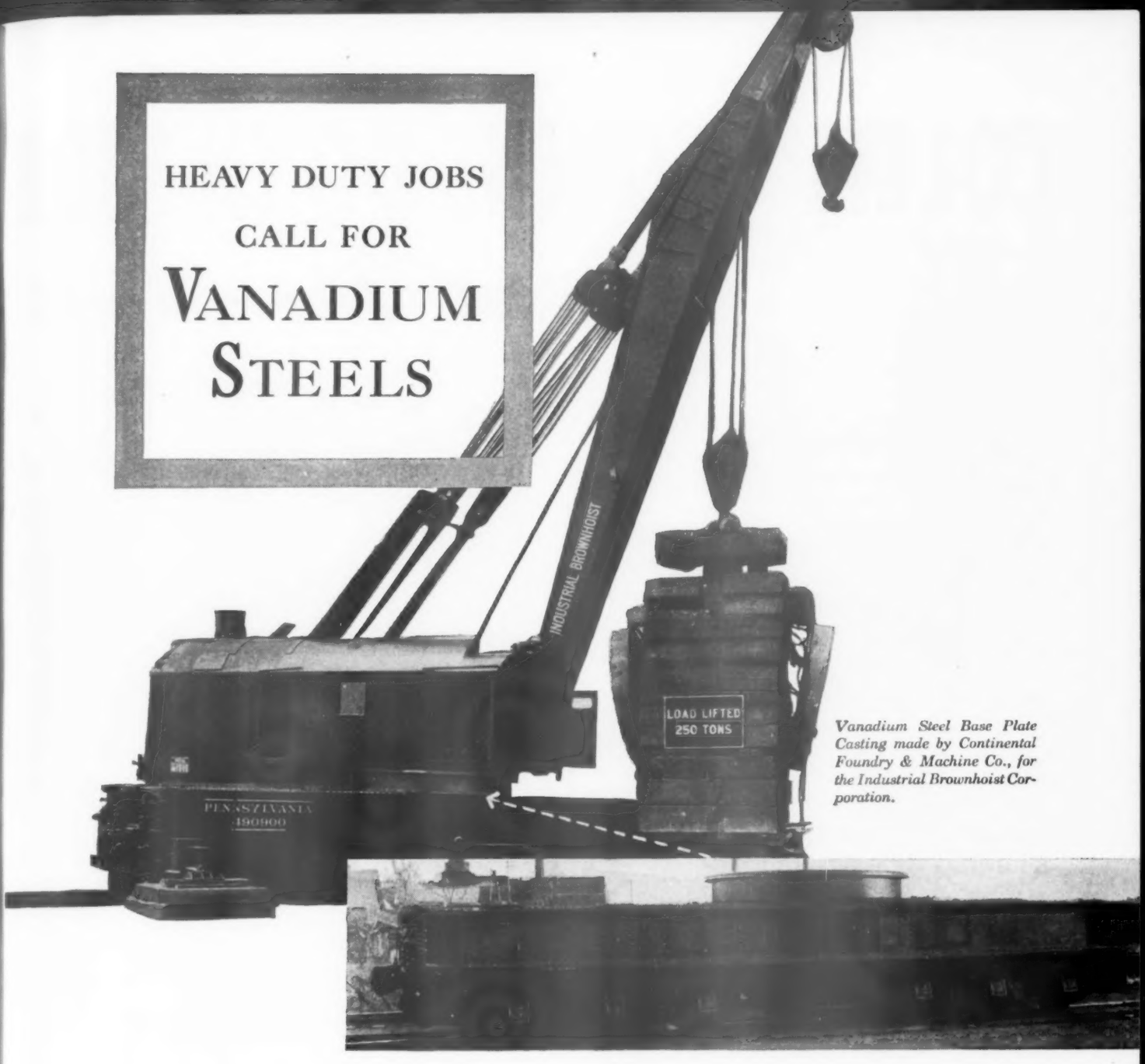
JOLT ROLL-OVER AND PATTERN DRAWS
Fast large capacity machines with roll-out conveyors—4 sizes

Write for fully descriptive catalog giving complete specifications.

THE JOHNSTON & JENNINGS CO.
857 Addison Road • Cleveland 14, Ohio

IMPROVED UP-TO-THE-MINUTE MOLDING MACHINES FOR EVERY NEED

HEAVY DUTY JOBS CALL FOR VANADIUM STEELS



Vanadium Steel Base Plate Casting made by Continental Foundry & Machine Co., for the Industrial Brownhoist Corporation.

This behemoth railway crane, designed to lift and shift multi-ton loads, is a typical construction job that calls for the *extra strength* of alloy steels.

That's why the load-carrying, structure-supporting base plate, weighing 25,000 pounds, was cast of Manganese-Molybdenum-Vanadium steel. The analysis and physical properties of this giant casting clearly show the advantages of this Vanadium steel for such applications.

Analysis:

C—0.30% Mn—1.25% Mo—0.22% V—0.12%

Physical Properties:

Yield Strength	55,000 psi min.
Ultimate Strength	85,000 psi min.
Elongation in 2 in.	20.0% min.
Reduction of Area	40.0% min.

Here is another application which demonstrates that *alloy steels can do many jobs better.* They provide extra strength and safety, overall economy in processing, and increased life. Let our metallurgical staff work with you in the application of alloy steels to your special fabricating and construction problems. Their broad experience may provide invaluable assistance

MAKERS OF VANCORAM FERRO ALLOYS AND METALS

"VANADIUM STEEL CASTINGS" is the title of a new technical booklet we have just published on this important subject. A request on your business letterhead will bring you a copy by return mail.

VANADIUM CORPORATION OF AMERICA

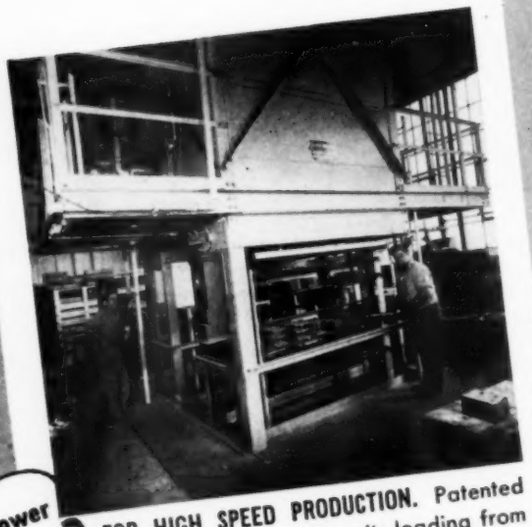
420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

COLEMAN OVENS DO THE JOB BE

The definite re

Rolling Drawer Ovens — **FOR SPEEDY BAKING OF SMALL AND MEDIUM CORES.** Available in wide range of sizes and capacities.

Transrack Ovens — **FOR OPERATION WITH PORTABLE RACKS.** Single or double rack capacity.



Tower Ovens — **FOR HIGH SPEED PRODUCTION.** Patented Center Passageway permits loading from both inside and outside the Tower and increases accessibility as much as 300% compared with other vertical oven designs.

Car Type Ovens — **FOR HEAVY CORES OR MOLDS.** Most of the large core and mold ovens in operation in every class of foundry production are Coleman Car Type Ovens.

Continuous Mold Ovens — **FOR HIGH SPEED CONTINUOUS DRYING OF MOLDS.** The results produced by these ovens are sensational, and have created entirely new conceptions of mold drying speed and dry sand economy.

COLEMAN CORE *and* MOLD OVENS

The **FOUNDRY E**

CLEVELAND 13, O

BUILDERS OF COLEMAN A

B BETTER *and* CHEAPER!

e result of 40 years'

FOUNDRY OVEN SPECIALIZATION

Coleman Ovens are backed by the specialized know-how gained in building thousands of successful installations in foundries everywhere, producing all types of castings. This wide background of experience enables our engineering staff to render invaluable service in the selection of the correct core-baking or mold-drying equipment to do your job in the best and most economical manner.

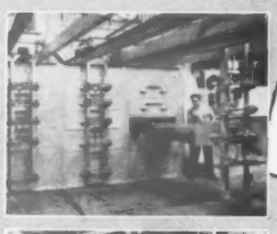
In the production of every type of castings, gray iron, malleable, steel, alloy, aluminum or magnesium and regardless of whether your cores are large or small, heavy or light, you can rely on Coleman Ovens to eliminate all uncertainties and variables in core baking.

Coleman Ovens are built in all types and sizes. Use the fuel most economically obtainable in your locality--gas, oil, stoker coal, powdered coal, electricity, etc. Perfect results guaranteed with any fuel.

OVER 8,000 SUCCESSFUL INSTALLATIONS

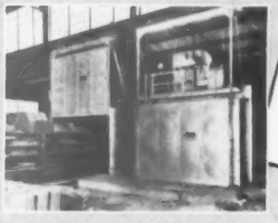
For further information, write for Folio of Bulletins.

COLEMAN Portable Core Ovens

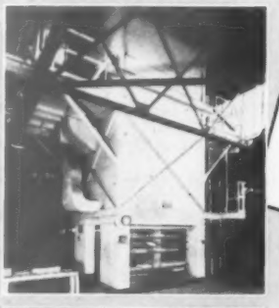


COLEMAN Rolling Drawer Ovens

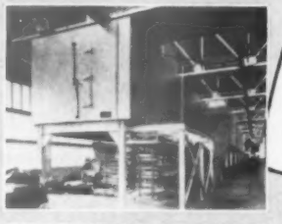
COLEMAN Transrack Ovens



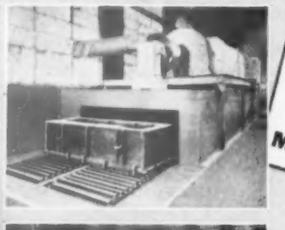
COLEMAN Car Type Ovens



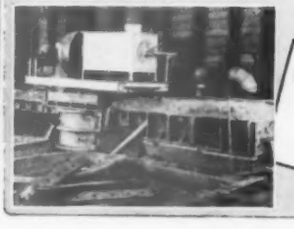
COLEMAN Tower Ovens



COLEMAN Horizontal Conveyor Ovens



COLEMAN Conveyor Mold Ovens



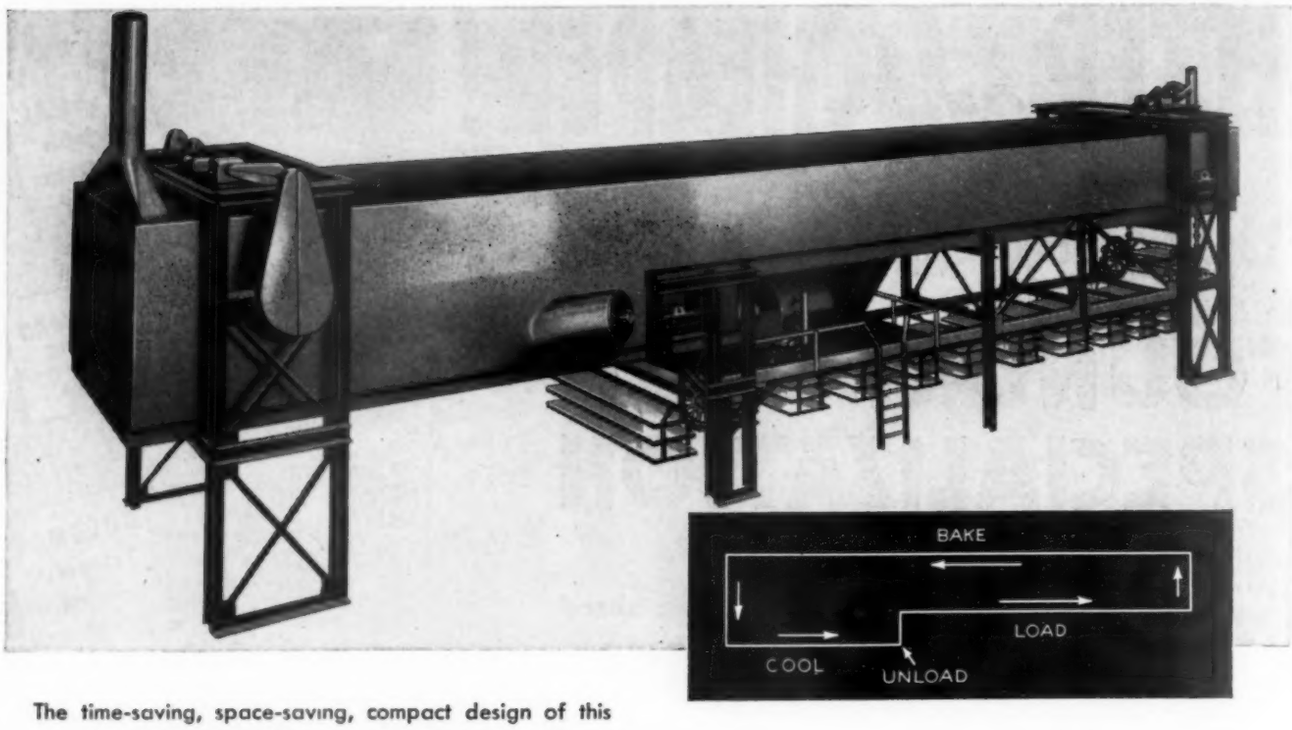
COLEMAN Portable Mold Dryers

Y EQUIPMENT *Company*

13, OHIO, U. S. A.

MEMBER

N AND SWARTWOUT OVENS



The time-saving, space-saving, compact design of this new Horizontal Core Oven is characteristic of Young Brothers' Engineering. Into it went the skill and confidence of many years of experience . . . also a thorough knowledge of the job to be done and the production problems involved.

This new core oven can be installed in practically any building without making any major structural changes.

The coremakers are located right next to the oven so that they can load the cores directly on the moving racks thus eliminating the necessity of transporting them on hand trucks or a conveyor from the core room. The location of the coremakers, at the oven, also saves core room space.

The size of the loading racks can be varied and the shelves can be adjusted to accommodate cores of many sizes and shapes.

Besides allowing for the removal of exhaust gases at the point of greatest concentration, the new oven design provides an effective cooling zone for the cores and assures comfortable working conditions for the coremakers.

This New Horizontal Core Oven is Young Brothers' answer to the demand for better core baking equipment. It is YOUR answer to the need for lower production costs and higher operating efficiency.

New HORIZONTAL CORE OVEN . . . . . offers many cost saving advantages!

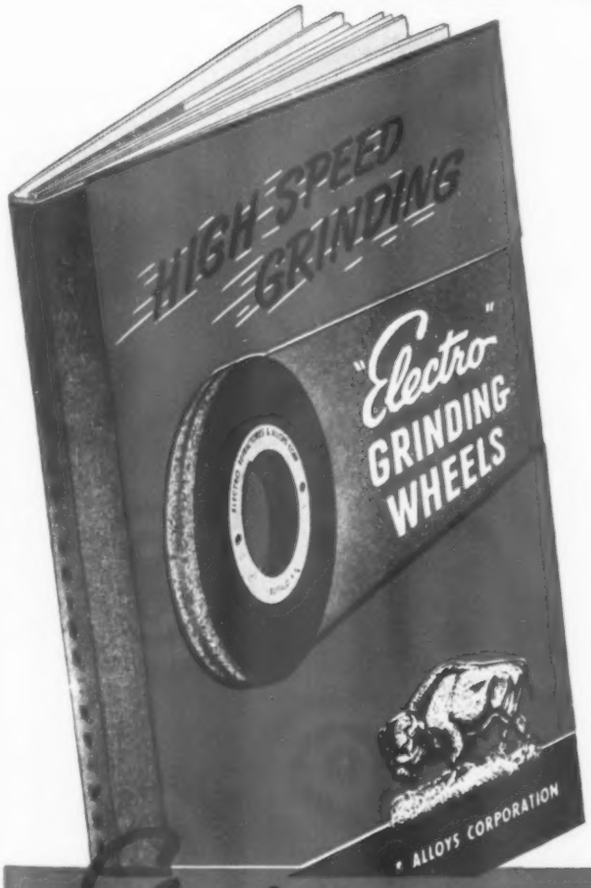
MEMBER

YOUNG BROTHERS COMPANY

6508 MACK AVENUE DETROIT 7, MICHIGAN

ESTABLISHED IN 1896

Electro HIGH SPEED GRINDING APPLIES ALL THE WAY!



The all-phase efficiency of Electro Grinding Wheels is now correlative with the ever-increasing hardness of steels and with the demand for greater speed, greater precision and greater safety. With new bonding, new designing and new *precision* processing of the abrasive grits, we accomplished this new super-efficiency and raised the safety factors in Electro Grinding Wheels to a new high.

We'll welcome opportunity to prove to you the cooler, cleaner, faster cutting and safer operation of these new Electro Grinding Wheels. We invite operating tests on your production in your plant. Spot service from Buffalo with stocks in Los Angeles. Phone us NOW! Buffalo, WASHington 5259; Los Angeles, Kimball 9209.

THE MOST TALKED-OF CATALOG IN INDUSTRY!

Electro's New Catalog 645 is the very latest manual on grinding tools and techniques. Illustrated in full color! We'll gladly send a copy free if you'll ask for it on your company letterhead.

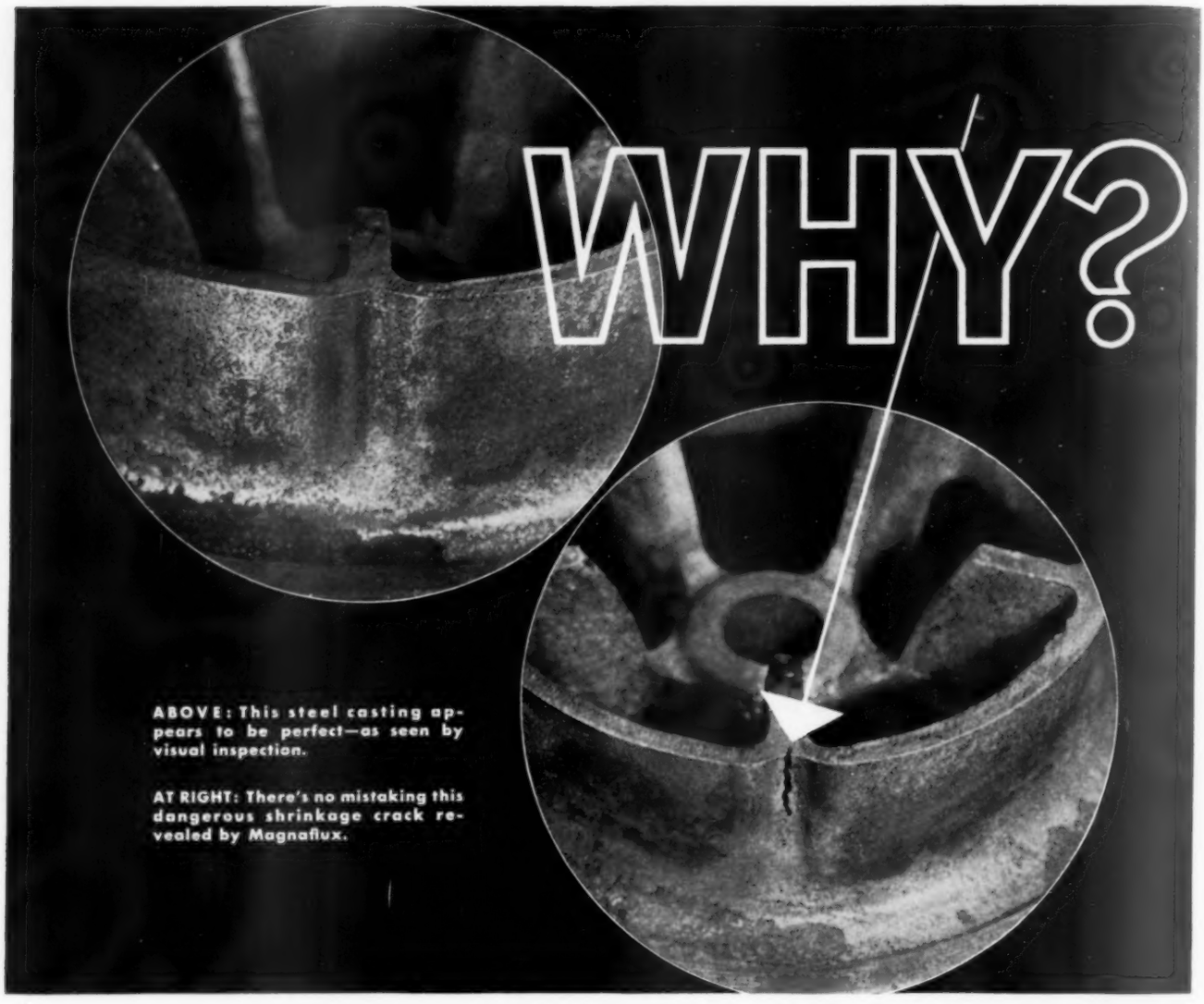
Electro TRADE MARK SINCE 1919

K-715

Electro REFRACTORIES & ALLOYS CORPORATION

MFRS. · REFRACTORIES · CRUCIBLES · STOPPERS · ALLOYS · GRINDING WHEELS

344 DELAWARE AVENUE — West Coast Warehouse Los Angeles — BUFFALO 2, NEW YORK


WHY?
ABOVE: This steel casting appears to be perfect—as seen by visual inspection.
AT RIGHT: There's no mistaking this dangerous shrinkage crack revealed by Magnaflux.

DETECTION Through **MAGNAFLUX*** Inspection Leads to **CORRECTION** of the Causes of Defects

Modern quality control in the foundry does not stop at culling out defective castings. It looks into every instance—seeks to trace and eliminate the causes for sub-standard production. More and more foundries use Magnaflux because it can detect *hidden flaws* continuously—non-destructively.

In addition to shrinkage cracks, Magnaflux reveals blow holes, porosity, cold shuts and many other surface and sub-surface discontinuities. Quickly and economically, the size, shape and location of such flaws are shown up in minute metallic particles. *With Magnaflux it's easy to analyze and correct the conditions that cause defects.*

It will pay you to investigate the possibilities of Magnaflux in building up effective quality control. Foundry inspection protects customer good will . . . *Write today for full details.*

*Magnaflux, Registered U. S. Patent Office, a trade mark of Magnaflux Corporation applied to its equipment and materials for magnetic particle inspection.

MAGNAFLUX CORPORATION
5900 Northwest Highway, Chicago 31, Illinois
NEW YORK • DETROIT • DALLAS • LOS ANGELES • CLEVELAND

Complete SCHNEIBLE DUST CONTROL for a Southern Michigan Brass Foundry

Schneible Ventilated Bench, used as a core knockout and sprueing station.

The mold shake-out at this brass foundry is ventilated by the plant's Schneible system.

In this large Michigan non-ferrous foundry, dust and fumes do not slow up the workers. The dust from shakeout, sand preparation and core knockout operations is continuously removed from the working zones for trouble-free disposal in a Schneible Multi-Wash Collector.

This foundry, in keeping with the trend in dust control installations for the peacetime era, uses proved Schneible equipment.

Schneible Multi-Wash systems provide complete control of dust and fumes at the lowest ultimate cost. A Schneible system functions for long periods without attendance and with a very minimum of maintenance. The collectors have no parts to break, burn, clog or rapidly wear, and provide simple sludge disposal.

Write for informative literature on Schneible Dust and Fume Control Equipment.

CLAUDE B. SCHNEIBLE CO.

2827 Twenty-Fifth St. Detroit 16, Mich.

Offices in Principal Cities

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

SCHNEIBLE

LIQUID-VAPOR INTIMATE CONTACT EQUIPMENT for DUST COLLECTION ABSORPTION CONDENSATION AND TEMPERATURE REDUCTION

This ---IS BUT ONE OF MANY EXCLUSIVE DESIGNS OF

CARL-MAYER
Foundry Ovens

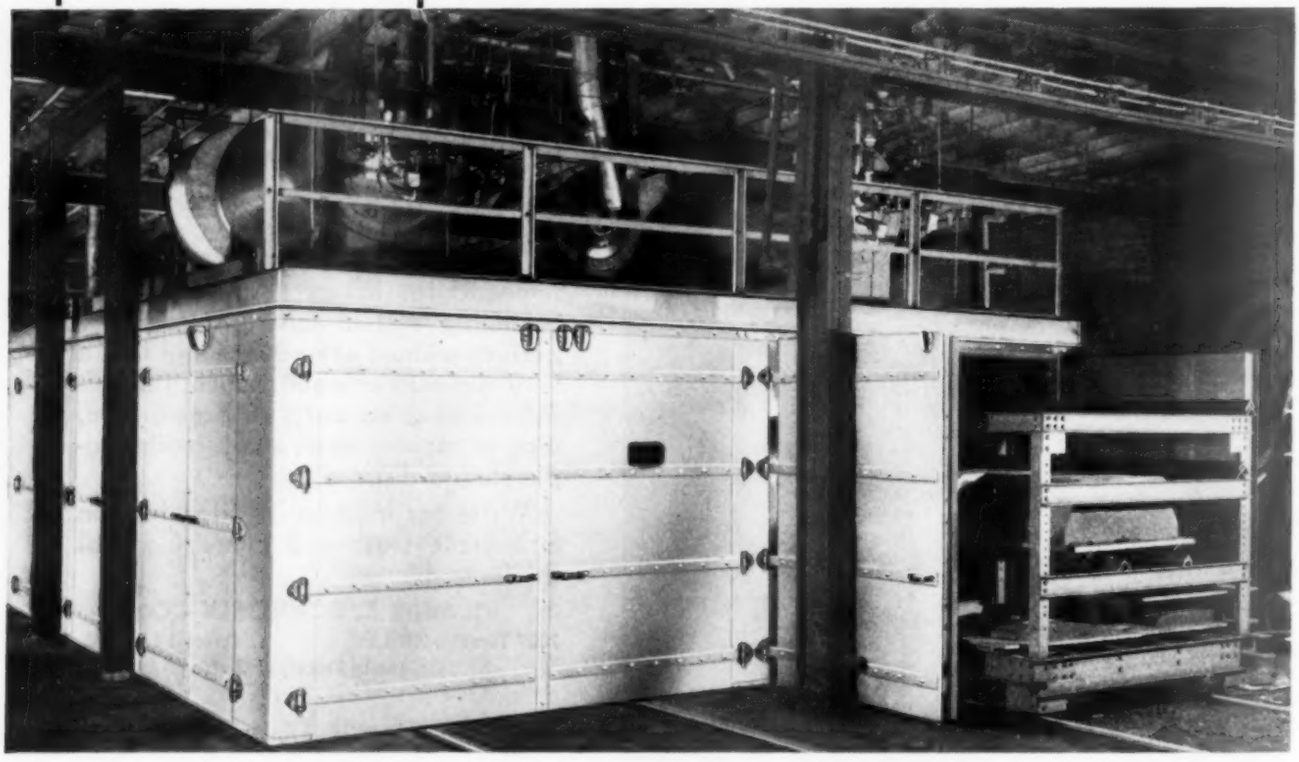
CARL-MAYER TWO-COMPARTMENT CAR TYPE OVEN FOR CORES AND MOLDS. Each oven, 12′ wide, 26′ deep, 9′ high. One oven is used for baking large cores at night and has doors on side, permitting its use as a rack type oven during the day. Other oven is for night baking. Both compartments are individually heated by a Carl-Mayer recirculating type gas-oil heater enabling use of either gas or oil.

Photo shows one of many exclusive Carl-Mayer oven designs specially adapted for highest efficiency and operating economy.

For more than 25 years leading foundries have come to Carl-Mayer again and again to meet their additional core and mold oven needs.

Before you decide on your next foundry oven installation, consult Carl-Mayer. Let us show you the production and fuel saving advantages of Carl-Mayer equipment.

Write for Bulletin showing the extensive line of Carl-Mayer Core and Mold Ovens.

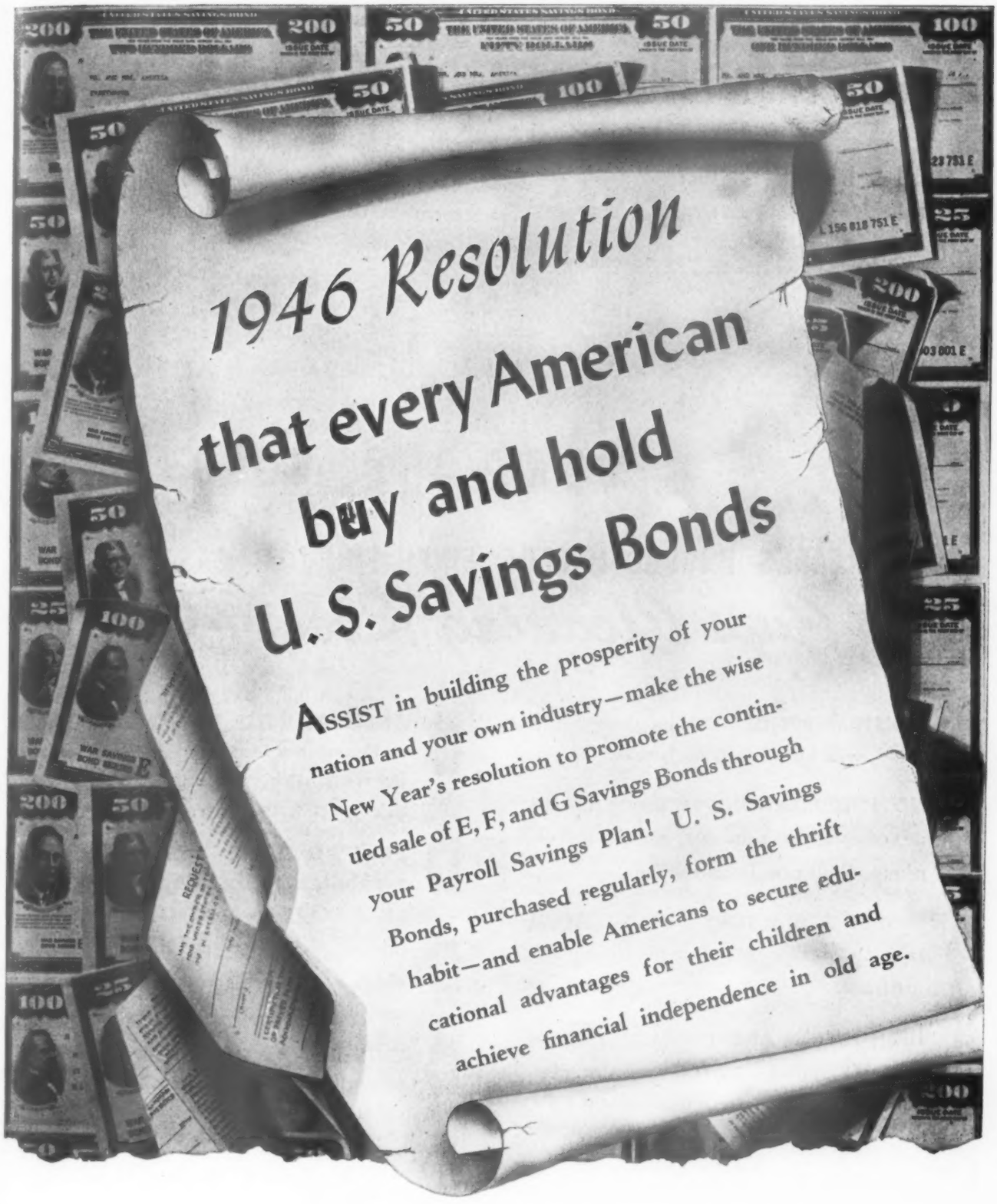


THE CARL-MAYER CORPORATION

3030 Euclid Avenue ● Cleveland, Ohio

SERVING CONCERNS LIKE *these:*

Aluminum Co. of America
American Radiator Co.
Brown Industries
Bucyrus-Erie Co.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
General Electric Co.
General Motors Corp. and Subsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
Shenango Penn Mold Co.
Studebaker Corp.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.


1946 Resolution
that every American
buy and hold
U. S. Savings Bonds
ASSIST in building the prosperity of your nation and your own industry—make the wise New Year's resolution to promote the continued sale of E, F, and G Savings Bonds through your Payroll Savings Plan! U. S. Savings Bonds, purchased regularly, form the thrift habit—and enable Americans to secure educational advantages for their children and achieve financial independence in old age.

The Treasury Department acknowledges with appreciation the publication of this message by

THE FOUNDRY

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and War Advertising Council

Ten EASY-TO-UNDERSTAND *Reasons* WHY

DELTA GRAKOAL

CORE AND MOLD WASH

INCREASES PRODUCTION OF FINER-FINISHED CASTINGS AND *Cuts Cleaning Room Costs*

1. **MOISTURE PROOF** — When thoroughly dried, will not absorb moisture.
2. **NO PRECIPITATION** — When properly mixed, will stay in suspension indefinitely. Will not deteriorate.
3. **HIGHLY REFRACTORY** — Molten Metal lays on surface without the least disturbance.
4. **HIGH FUSION AND UNUSUALLY HIGH HOT STRENGTH** — No fusion or sinter below 3400°F. Hot strength over 600 p.s.i.
5. **NO GAS** — It is non-reactive with molten metal and liberates no gaseous vapors.
6. **ANCHORS ITSELF TO SAND SURFACES** — Penetrates into sand surfaces, which prevents flaking, peeling, scabbing, when in contact with molten metal.
7. **EASY TO APPLY** — Can be sprayed, swabbed, dipped or brushed on either green or dry sand surfaces.
8. **PRODUCES SMOOTH SURFACES** — Casting surfaces are free from burn-in or metal penetration.
9. **CUTS CLEANING COSTS** — Surfaces are smooth and require minimum amount of cleaning.
10. **ECONOMICAL TO USE** — Covers greater surface area than other washes.

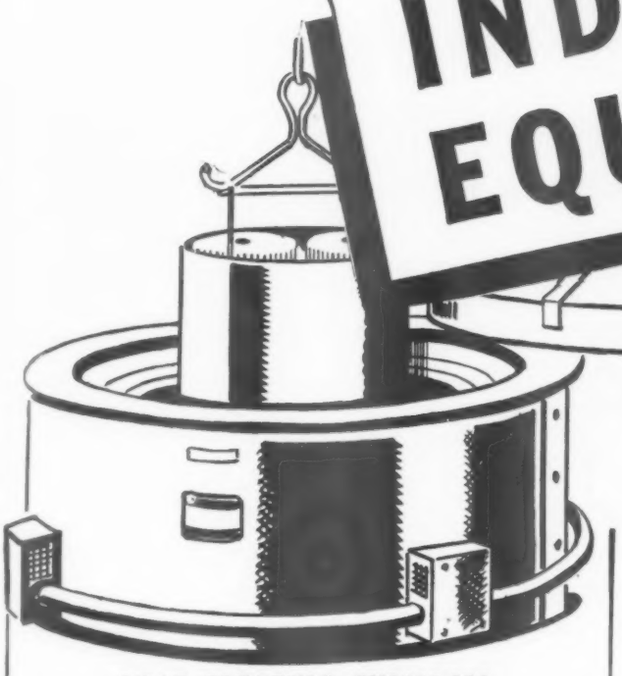
DELTA OIL PRODUCTS CO.

MANUFACTURERS OF FOUNDRY PRODUCTS, INDUSTRIAL AND AUTOMOTIVE OILS, GREASES AND COMPOUNDS

MILWAUKEE 9, WISCONSIN

GOVERNMENT-OWNED
WAR SURPLUS

INDUSTRIAL EQUIPMENT



FOR SALE

Our inventories of Industrial Equipment include practically every type and make needed to meet industry's reconversion needs! A large percentage of this equipment is new, or little used—and every item is priced low for quick recovery.

Get in touch with the RFC Agency Office nearest you and outline your needs. Act quickly—this equipment must be sold at once!

HEAT TREATING FURNACES

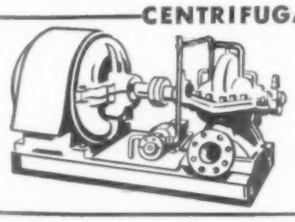
Disposal surplus heat-treating furnaces of practically every size and type for ferrous and non-ferrous applications, such as: normalizing, annealing, tempering, hardening, case hardening, surface hardening, nitriding, cyaniding. Batch type: car, box, pit, salt bath. Continuous types: portable and foundation designs. Fuel: gas, oil, electricity (high and low frequency).

MACHINE TOOLS

Government-owned surplus tools of every description being released to industry can help you reconvert. It is the job of the War Assets Corporation to dispose of this surplus property quickly and effectively. Toward that end we ask you to follow this simple 3 step procedure:

1. Submit in writing your requirements for machine tools and industrial equipment to us now.
2. Send a typewritten list to your nearest office listed below.
3. Make your descriptions brief, one line if possible, clearly grouping various types of equipment you need.

CENTRIFUGAL PUMPS



Available at most agencies in sizes 1½" to 6", complete with prime mover, usually electric motor driven.

Write, wire or phone your requests to the nearest RFC agency listed below for more detailed information. Credit terms may be arranged. If your local office does not have all the equipment you need, it will endeavor to locate it from other offices throughout the country.

VETERANS: To help you in purchasing surplus property from War Assets Corporation, a veterans' unit has been established in each of our Disposing Agencies.

CHECK THIS LIST FOR THE EQUIPMENT YOU NEED

Check the types of equipment on which you desire further and continuing information. Mail the coupon to your nearest RFC office listed below. Your name will be placed on our regular mailing list.

- ☐ Heat-treating furnaces (for all purposes)
- ☐ Gantry type cranes
- ☐ Extrusion Presses
- ☐ Electric and Pneumatic tools
- ☐ Centrifugal and rotary pumps
- ☐ Welding equipment
- ☐ Chemical equipment
- ☐ Thermal dryers-dehydrators
- ☐ Generator sets (internal combustion engine driven)
- ☐ Baling presses
- ☐ Electric copper cable
- ☐ Anti-friction bearings
- ☐ Bonded and coated abrasives
- ☐ Cutting tools

NAME .....

TITLE .....

COMPANY .....

ADDRESS .....

15-277

A DISPOSAL AGENCY DESIGNATED BY THE SURPLUS PROPERTY ADMINISTRATION for Surplus Producers' and Capital Goods, Aircraft and Plants formerly handled by Reconstruction Finance Corporation and for Surplus Consumer Goods formerly handled by United States Department of Commerce.

WAR ASSETS CORPORATION

(A SUBSIDIARY OF RECONSTRUCTION FINANCE CORPORATION)

RFC OFFICES (INCLUDING FORMER DEPARTMENT OF COMMERCE REGIONAL SURPLUS PROPERTY OFFICES) LOCATED AT: Atlanta • Boston • Chicago • Denver • Kansas City, Mo. • New York • Philadelphia • San Francisco • Seattle • OTHER RFC SURPLUS PROPERTY OFFICES LOCATED AT: Birmingham • Charlotte • Cleveland • Dallas • Detroit • Helena • Houston • Jacksonville • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • Oklahoma City • Omaha • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • Spokane • OTHER FORMER DEPARTMENT OF COMMERCE REGIONAL SURPLUS PROPERTY OFFICES LOCATED AT: Cincinnati and Forth Worth

Foundrymen . . . At This Critical Time

With Labor and Material Costs Mounting . . .

we announce the perfection of a

NEW and MORE POTENT

CASTFLUX
TRADE MARK REG.

which reduces casting rejects and remelting of riser metal to a NEW LOW POINT never before obtained in the industry . . .

• In the riser, in the ladle, new CASTFLUX produces greater profits because it drastically cuts operating losses, as well as facilitating production. The reasoning is simple. A greater amount of sound castings against a negligible amount of rejects means reduced losses in this phase of your operations. Losses must be reduced in the face of increased material and labor costs—else profits will shrink to a vanishing point.

• New CASTFLUX does not raise your costs for this item as it is so potent that you need only use 75% of the amount of flux formerly used to achieve CASTFLUX'S superior results.

• New CASTFLUX has been used for months in many foundries, and the results are a matter of record. In the pouring of steel and iron, the temperature of the metal in the riser was raised to a higher degree and maintained for a longer time. In addition CASTFLUX also substantially increases the fluidity of the metal and maintained the fluidity during the entire cooling down period. In the Ladle, CASTFLUX cleaned and purified the metal, bringing to the surface occluded oxides and gases, also slag, dirt and other foreign materials. Chipping was eliminated as well as saving the ladle lining.

• Now foundrymen — National's chemical engineers have perfected this new flux with one aim in mind — to enable you to achieve a higher degree of profitable production. Will you give CASTFLUX a fair trial?

CASTFLUX is sold on an unconditional guarantee. Send us your trial order, minimum 125 pounds. Use CASTFLUX as directed. If it does not produce as claimed, material can be returned at no expense to yourself.

NATIONAL PIGMENT COMPANY
2115-2117 EAST YORK STREET, PHILADELPHIA 25, PA.

There is often a great variance—and often a great deal of argument—between Good, Better and Best. But there is no reason to associate these terms with molds produced on Herman Molding Machines—for you are assured that every mold will be *uniformly perfect* and that castings produced from them will be of *uniformly high quality*.

In addition to producing uniformly perfect molds Herman Molding Machines also produce molds in great quantities quickly and cheaply. These features add up to P-R-O-F-I-T-S in your foundry operation. Herman engineers have been whipping tough molding jobs for more than forty years and have developed the "know-how" that has made the name HERMAN world-famous in foundry circles. These engineers will be glad to study your molding problems and specify the size and type Machines that will best suit your requirements.

Jarring and Jarr Stripping Machines are available in any size or capacity up to 140,000 pounds. Jarr Rollover and Pattern Drawing Machines are available in a variety of sizes ranging from 750 pounds to 40,000 pounds rollover capacity in Pitless and Pit Types. Independent Rollover and Pattern Drawing Machines are also available for use with Plain Jarring Machines you may now have in operation.

Regardless of which Herman Molding Machine you choose, you are assured of highest efficiency, greatest speed, and minimum maintenance for the entire service life of every Herman. We'll be glad to discuss your problems with you.

MOLDING HERMAN MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

There are two major factors in the speed which Gas brings to modern industrial and commercial operations. First there is the speed with which Gas comes on the job. It needs no gasification as do other fuels—Gas gives instant heat, swiftly reaching the temperature required by the setting at the control panel—and Gas maintains absolute fidelity to that setting.

Then there is the speed with which Gas imparts its inherent heat to the materials which must be processed or dried, for Gas utilizes the three basic principles of heat transfer—convection, radiation, conduction. Modern Gas research has developed equipment designed to transfer the heat of Gas at highest efficiency, with greater speed and depth of penetration.

You will benefit from the results of the research of the American Gas Association and Gas equipment manufacturers if you consult the Industrial Gas Engineer of your local Gas Company. He can help you secure faster, more efficient, more economical manufacture of improved products. You incur no obligation by consulting him.

THE TREND IS TO GAS
FOR ALL
INDUSTRIAL HEATING

AMERICAN GAS ASSOCIATION
420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

MELTRITE

More used than any other merchant pig iron...

P M

PICKANDS MATHER & CO.

CLEVELAND • CHICAGO • DETROIT
ST. LOUIS • ERIE • DULUTH
MINNEAPOLIS • TOLEDO

IRONORE • PIGIRON
COAL • COKE

Such Preference MUST BE MERITED!

READY TO FABRICATE SURPLUS *aluminum*

AT 15% TO 45% LESS
(FOB Location)

GOVERNMENT-OWNED STOCK

Here—in production quantities—is the aluminum you need at fixed prices, 15% to 45% off current mill prices, depending on the particular alloy. Much of this special value stock, originally ordered for war plane construction, is still in its original packing. It may be readily fabricated and is available in standard sizes and shapes. Perhaps this material is just what you need to get into full civilian production faster and it costs nothing to find out. Take these three simple steps today:

1. Estimate, for any convenient period, your production needs in each specification, finish, gauge, etc.

2. Then write, wire, or phone that data to your nearest War Assets Corporation office* below. We will advise you of the location of the stock you need, estimate possible delivery dates, quote prices and help arrange credit where indicated.

3. When satisfactory arrangements have been made, we will start shipments.

* NEW SURPLUS STOCK RELEASED DAILY

War Assets Corporation is a Reconstruction Finance Corporation subsidiary in charge of disposing of surplus war materials constantly being released to War Assets Corporation. To reach War Assets Corporation, simply contact your nearest R.F.C. office listed below.

VETERANS OF WORLD WAR II:

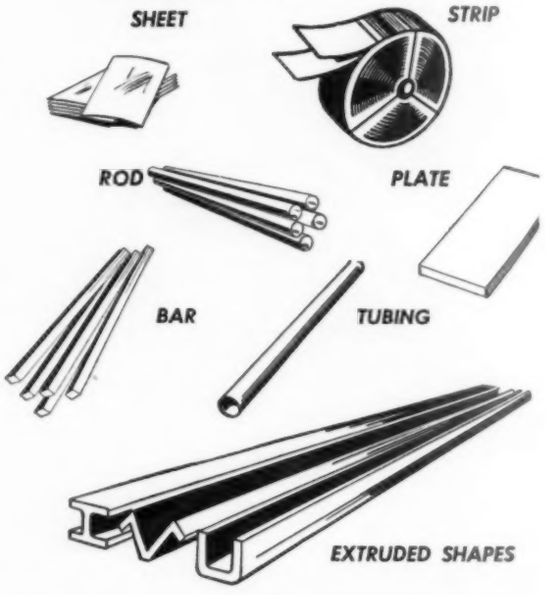
To help you in purchasing surplus property from War Assets Corporation, a veterans' unit has been established in each War Assets Corporation Regional Office listed below.

ATTENTION

POWDER METALLURGISTS!

Atomized Aluminum powder —not suitable for paint without further processing—is available in enormous quantities at 10¢ per pound. Can you find a major use for this product? If you can.....!!! Get detailed specifications from your War Assets Corporation office listed below.

TYPES AVAILABLE



A DISPOSAL AGENCY DESIGNATED BY THE SURPLUS PROPERTY ADMINISTRATION for Surplus Producers' and Capital Goods, Aircraft and Plants formerly handled by Reconstruction Finance Corporation ... and for Surplus Consumer Goods formerly handled by United States Department of Commerce.

WAR ASSETS CORPORATION

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157-3

Solve YOUR DUST PROBLEM

with a MAHON *Hydro-Foam* SYSTEM

REMOVES THE DUST FROM INDUSTRY — INDUSTRY

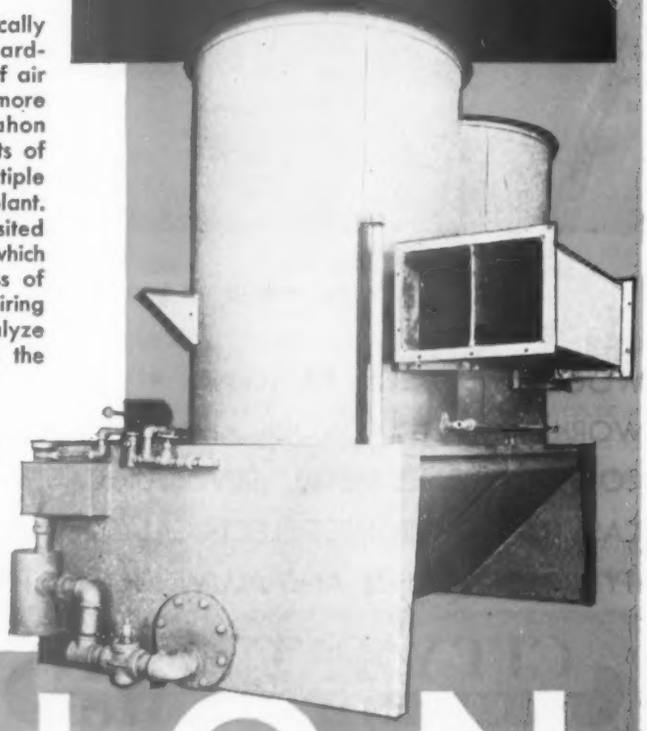
. . . it's the FOAM that DOES IT!

STANDARD *Hydro-Foam* DUST COLLECTOR UNIT

PATENTED

No Pump • No Nozzles • No Jets
No Fabric Screens, Dust Bags, or other Removable Parts Requiring Cleaning, Repairing or Replacement

Your dust problem can be solved permanently and economically with the patented Mahon Hydro-Foam Dust Collector. Regardless of what your dust condition may be, or what volume of air must be handled, the Hydro-Foam principle will do it more efficiently and more economically. Why? Because Mahon Hydro-Foam Collectors are manufactured in Standard Units of various capacities and are manifolded together in multiple batteries to meet the requirements of your particular plant. Dust is effectively removed from the air and safely deposited under water . . . an automatic sludge removing device, which keeps the sludge tank clear, completes the simple process of dust elimination . . . a completely automatic system requiring less attention and less service. Have a Mahon engineer analyze your dust problem today, and explain to you in detail the advantages of the patented Hydro-Foam Collector.



Address Correspondence to INDUSTRIAL EQUIPMENT DIVISION

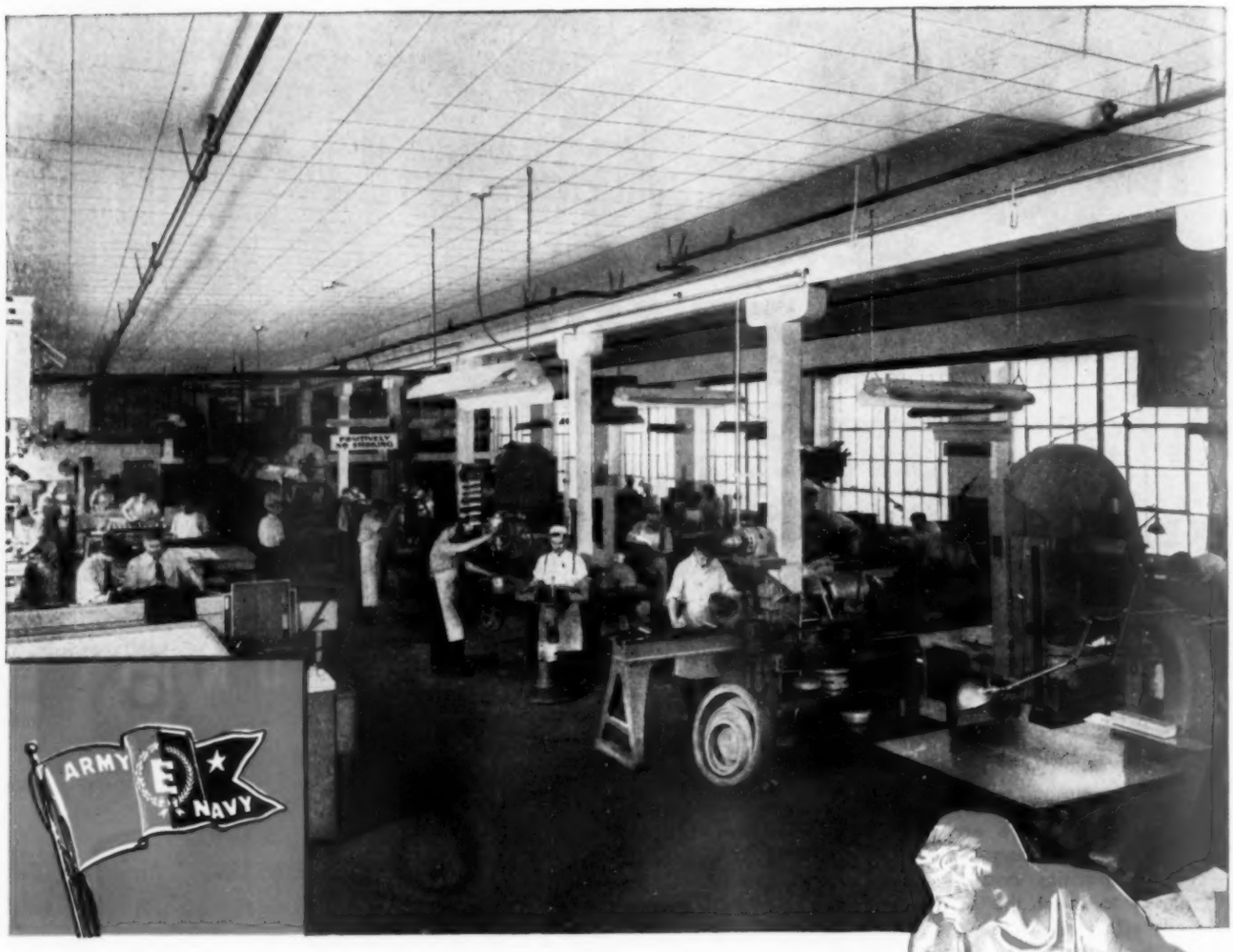
THE R. C. MAHON COMPANY

HOME OFFICE AND PLANT, Detroit 11, Michigan
WESTERN SALES DIVISION, Chicago 4, Illinois

Engineers and Manufacturers of Dust Collecting Systems, Complete Finishing Systems including: Metal Cleaning Machines, Rust Proofing Machines, Dry-off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Units, Drying and Baking Ovens. Also Annealing Ovens and Core Ovens, and many other Units of Special Production Equipment.

MAHON

CRAFTSMANSHIP is a result of years of experience, careful application and work accomplished in pleasant, quiet, clean surroundings.



A PARTIAL VIEW OF THE WOOD PATTERN DIVISION

WOOD AND METAL PATTERNS • KELLER AND DUPLICATOR WORK • MACHINE WORK • MALLORY METALS • BERYLLIUM COPPER • MONEL METAL • EVERDUR CASTINGS • COPPER CASTINGS OF HIGHEST ELECTRICAL CONDUCTIVITY • BRASS, BRONZE AND ALUMINUM CASTINGS

CITY PATTERN
FOUNDRY AND MACHINE CO.

1161 HARPER AVENUE AT RIVARD
DETROIT 11, MICHIGAN

AO FOUNDRY GOGGLES

SAFETY WITH COMFORT

Put N.F.A. and N.A.S.O. Goggles on your ladlemen so that they can keep their eyes on their work safely, comfortably—steadily.

Super Armorplate lenses have high impact resistance—permit the wearer to work without worrying. Snug-fitting, pliable leather mask and wire-screen ventilation around eye-cups afford maximum comfort and coolness—one-piece headband won't slip or catch in hair.

When ordering, specify either clear lenses or lenses made of glare-absorbing Calobar in medium, dark or extra dark shades. 6 curve Super Armorplate clear or Calobar lenses also available. Catalog No. 304 and 305.

American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS

When You Install DUSTUBE Filter Tubes

You Need Only

ONE MAN + THESE TOOLS

Inserting "Dustube" bag into cell plate on a "Dustube" Dust Collector.

1ST DO THIS

2ND DO THIS

and the JOB IS DONE

Operator hanging a "Dustube" bag on an overhead hook attached to the shaker channel.

WRITE FOR CATALOG 72
A 54 page illustrated book showing the full line of Dustube dust collecting equipment. Contains valuable data on ventilation.

Yes . . . that's all there is to it. It's a quick and easy job to install filter tubes in a Dustube Dust Collector. No tools are necessary, just a pair of hands. One man can do the job quickly, and he always works on the clean air side . . . never on the dirty air side. Tubes can be inspected from a central walkway without removing them. Features like these keep maintenance costs way down. Since the tubes are compact and light, they are easy to store, easy to handle, economical to ship, and do not burden the collector with excess weight.

Simplicity of design and ease of operation are just two of the many important features of the Dustube. Why not get complete facts about it? A request will bring you our latest literature by return mail . . . and without obligation. Ask for Catalog 72.

American
FOUNDRY EQUIPMENT CO.
505 SOUTH BYRKIT ST. MISHAWAKA, IND.

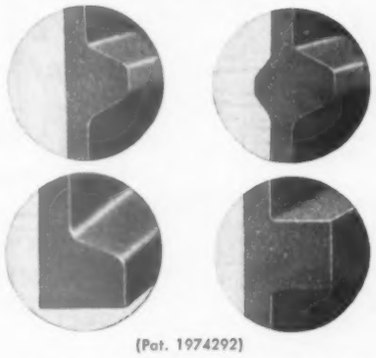
dustube
DUST COLLECTORS

Large Order for Flasks Reflects Confidence in Sterling Quality

What is believed to be the largest order for foundry flasks included in a single shipment, left the Sterling plant recently. Seven solid carloads of flasks . . . 2,400 sections totaling 155 tons . . . went speeding on their way to a well-known foundry in the Pacific area. Practically every style and size of flask fabricated by Sterling was included in the shipment . . . Frankly, doesn't such a huge order suggest confidence in Sterling's ability, both to produce quality foundry flasks, and to deliver these flasks in any desired quantity?

Sterling Style "LT" Rolled Steel Flask with double pin lugs, steel handles and trunnions.

Sterling Style "AA" Rolled Steel Flask with single pin lugs. Hardened steel bushings. Flat steel lifting handles.



(Pat. 1974292)

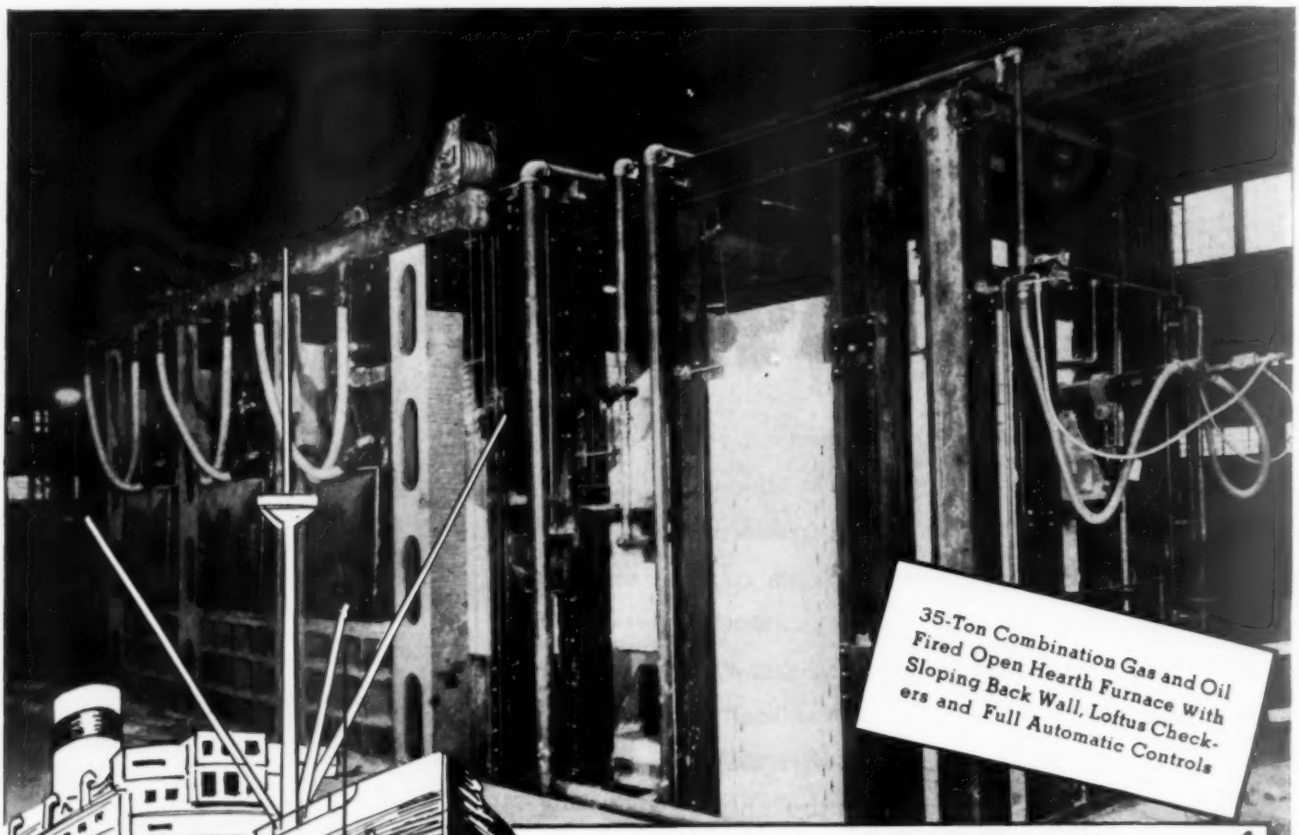
Integral ribs and flanges; solid center reinforcing-rib; square flanges; full-width bearing, aids speed and accuracy . . . simplifies ramming and shaking out.

Sterling Style 3/8" NNT Heavy Duty Channel Steel Flask.

Sterling FOUNDRY FLASKS

STERLING WHEELBARROW COMPANY • MILWAUKEE 14, WIS., U. S. A.

A 4943-1P



35-Ton Combination Gas and Oil Fired Open Hearth Furnace with Sloping Back Wall, Loftus Checkers and Full Automatic Controls

Geared for Export!

Melting, Heating and Industrial Furnaces for Steel Mill, Foundry, Aluminum, Copper and Brass.

In this country and throughout the civilized world modernization is the keynote in industrial reconversion and rehabilitation. With broad experience and highly trained staff the Loftus Engineering Corporation is prepared and equipped to serve in the modernization or complete construction of plants in any hemisphere.

Consultation on export problems invited.

610 SMITHFIELD ST. **LOFTUS ENGINEERING** *corporation* PITTSBURGH, PA.

Designers and Builders **Engineers, Consultants, Contractors**

. . . eenie meenie minie mo . . .

When you buy Simonds* Grinding Wheels, you avoid the unnecessary risk of chance selection. From thousands of combinations of grain, grade, structure and bond, you can narrow down selection to wheels adapted to your job and to your equipment for maximum economy of operation, including low wheel cost. Whether you are dealing in roughing dimensions or the micro-inches of finishing, there is a Simonds Borolon (aluminum oxide) or Simonds Electrolon (silicon carbide) wheel to reveal new grinding efficiency for you.

Through Simonds Abrasive Company distributors over a half century grinding wheel experience provides abrasive products and service backed by engineering and ceramic skill proved by continuous experiment, test and inspection.

The Simonds Abrasive Company 120 page Data Book is good guidance for specification of Grinding Wheels; Segments; Mounted Wheels and Points; Grains, Bricks and Sticks. A copy is available on request.

** Time-honored Borolon and Electrolon Abrasive Products are now distinguished by the name Simonds.*

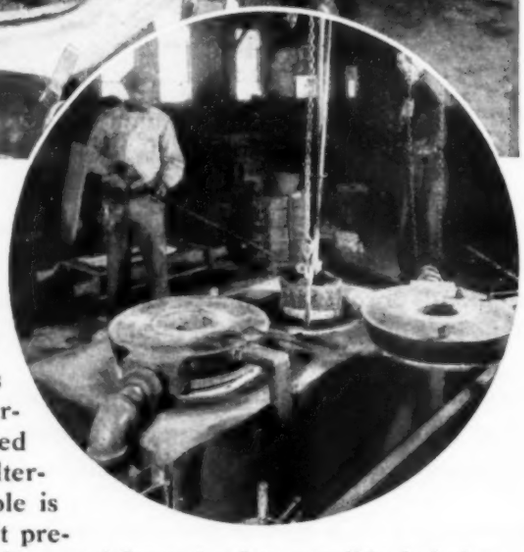
SIMONDS ABRASIVE CO. *is a Division of*
SIMONDS SAW & STEEL CO.

Other affiliated companies are Simonds Steel Mills and Simonds Canada Saw Co., Ltd.

SIMONDS
ABRASIVE CO.

SIMONDS ABRASIVE COMPANY · PHILADELPHIA 37, PA. · DISTRIBUTORS IN ALL PRINCIPAL CITIES

Scrap your old crucible furnace now at a Profit



Here is a "revolutionary" TOP fired crucible melting furnace... it's different... it's new... and it's better. This Radiant Combustion, Inc. furnace has two crucibles, loaded at all times... they are fired alternately. While the first crucible is heated, the flue gases from it preheat the second crucible. While metal from the first crucible is being poured, a third crucible replaces the removed crucible to receive cold metal. The covers are cam lifted and swung backward independent of one another, allowing each side to be alternately fired. The advantages are so outstanding that no one can afford to use the older type. Refer to column on right-hand side... *write today.*

18 REASONS

1. 25 to 30% fuel saved on aluminum and magnesium. 40 to 50% fuel saved on brass and copper.
2. 50 to 100% longer pot life.
3. 50 to 100% longer lining life.
4. 50 to 100% longer cover life.
5. 50 to 100% longer burner life.
6. Easy to charge. (No flame through cover)
7. Far lower metal loss. (Flame does not impinge on metal)
8. Faster heating. (Combined radiant and convection heating)
9. Less slagging. (Less slagging and no slag build up possible)
10. Lining is easy to replace. (No burner ports)
11. Burners easy to inspect and replace. (Change in 15 minutes)
12. Burners cannot plug. (Burners in top where slag or metal cannot reach them)
13. Pure metal. (Neutral pressure on metal surface allows charcoal or atmosphere to be used)
14. Furnace can be flued through the floor to the outside, eliminating heat and gases in foundry.
15. No leakage of cover. (No flame through or around cover)
16. Quiet operation.
17. Unobstructed flueing. (Flued at bottom and charge does not affect it)
18. Metal is visible at all times and temperature can be taken at any time, without shutting off burners.

RADIANT COMBUSTION, INC.

BUILDERS OF EVERY TYPE (OIL, GAS, ELECTRIC) OF HEAT TREATING FURNACE

WARREN, I . . . OHIO

A *Real* INVESTMENT FOR MORE PRODUCTION!

DIAMOND FLASKS

No matter what happens—you'll never be wrong if you equip for production with *good* flasks. Because we can give you many exclusive features in a flask developed over a period of 50 years, it can also be said that, "You can't go wrong on a Diamond," either. Note these important features:

- **A SUPERIOR LATCH (exclusive)**

  It's self-compensating for wear. The tighter you draw it, the firmer the grip. Has special cam which is easily adjustable as extreme wear on parts develops. Only *Diamond* has this patented feature.

- **PRECISION-MADE**

  Made from the finest grade of well-seasoned cherry stock, all flasks are made to precise measurements according to your specifications.

- **A PATENTED HINGE (exclusive)**

  Note the construction of Diamond hinges. The lugs are carefully milled and are interlocking which eliminates "play" no matter how long or how hard the flask is used.

- **SPECIAL SHAPES**

  We regularly supply customers with special shape flasks, including round flasks, and special cut partings.

STEEL JACKETS

Made from Nos. 7 to 10 gauge steel, true to size and taper. Are practically indestructible, and retain their shape under severest conditions. Thousands of these jackets in use.

DIAMOND

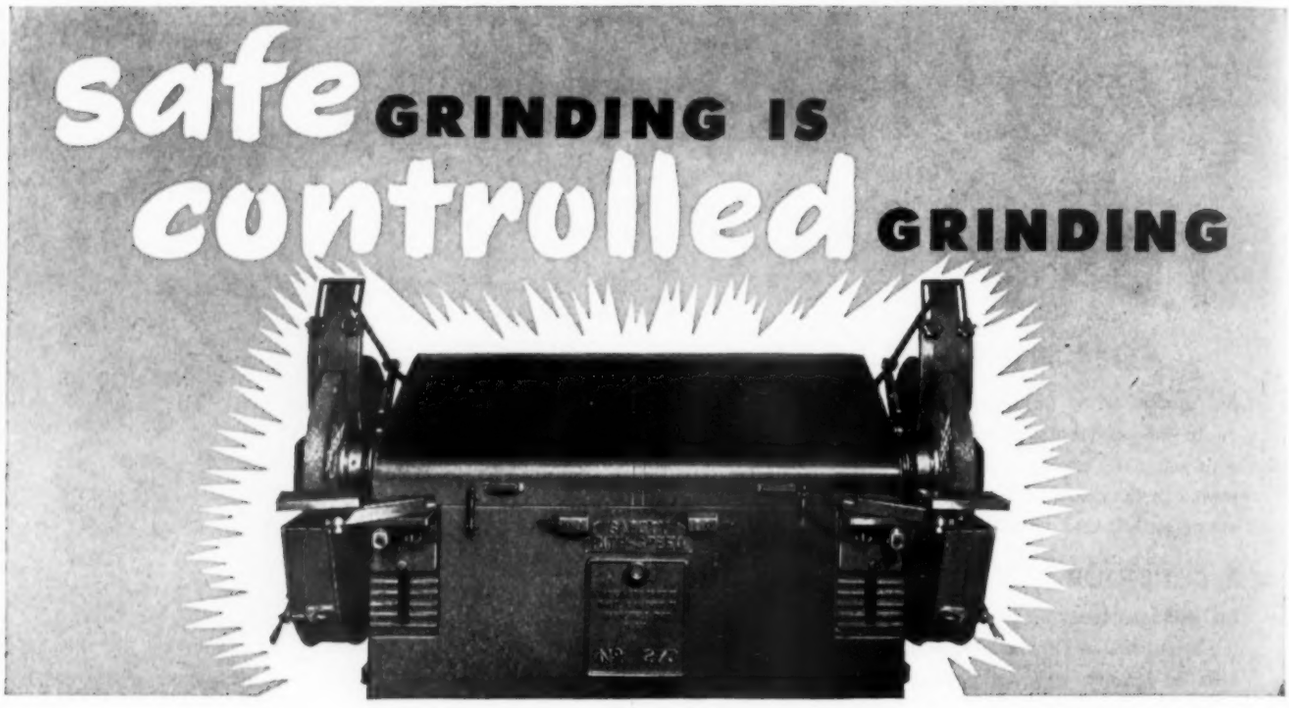
CLAMP AND FLASK COMPANY

Telephone 2553

Richmond, Indiana

Designers of CORE PLATES, JACKETS, BANDS, FLASKS *since 1889*

safe GRINDING IS controlled GRINDING



. . . absolute control is available now in

SAFETY "RITE-SPEED" GRINDERS

with dual control systems

. . . CHANGEABLE SPEED . . . SAFETY INTERLOCK

Your assurance of the very best results in grinding work is constant control of peripheral speed. It is *the* factor of utmost importance. SAFETY research engineers proved it . . . then developed the distinctive SAFETY "Rite-Speed" principle which provides for *correct initial speed* and the *maintenance* of *continual* correct speeds during the course of the job and the life of the grinding wheel. In SAFETY "Rite-Speed" GRINDERS, the rotative speed of the grinding wheel is increased as the wheel becomes smaller to maintain optimum peripheral speed continuously by—

"CHANGEABLE SPEED" or "INTERLOCK SYSTEMS"

In the "Interlock" method, the machine automatically stops when the grinding wheel has been reduced to a predetermined diameter. It is then instantly adjusted and grinding resumed.

In the "Changeable Speed" system, the correct surface speed is re-established by increasing the r.p.m. of the spindle. Motor pulleys in various sizes furnished with "Rite-Speed" GRINDERS, can be changed in but a very few minutes, with minimum effort.

SAFETY "Rite-Speed" double wheel, stationary GRINDERS, Swing Grinders and Grinding Wheels, tailor-made for every purpose, can help solve your grinding problems for more profitable operation by speeding up production, lowering costs! For further information on these products, their application to your business and more about this reliable, over-half-a-century old company, wire, phone or write our factory, or any of our offices listed, for prompt action. Do it *today!* Ask for descriptive booklets.

Safety

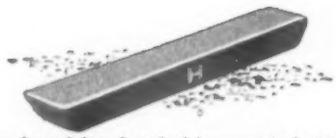
GRINDING WHEEL AND MACHINE COMPANY

Main Office and Factory
SPRINGFIELD, OHIO • Phone 4651

• Sales Offices
★ Sales Offices and Warehouses
Maintained for Quick Service and Fast Deliveries

• Birmingham—3-3323 ★ Chicago—TRiangle 8308 ★ Cleveland—MAin 6479-80
★ Detroit—TOwnsend 8-4740 ★ Pittsburgh—ATlantic 5218
• Bridgeport—5-9539 ★ Philadelphia—WAlnut 3132 ★ St. Louis—CEntral 3676
• Milwaukee—Mitchell 0265 • St. Paul—Midway 4774 • Syracuse—5-2944

HANNATEN IRON INGOT



For foundries that find larger pig better suited to their needs, the 38-pound Hanna pig is available in all grades and brands.

You can get an accurate furnace charge with HannaTen without resorting to sledge hammers. Accurate weight and chemical analysis for every charge can be secured easily: each ingot weighs approximately ten pounds, and has a precise chemical content, making it easy to "balance off" each charge.

Additional advantages of faster handling at all times, and faster, more uniform melting, have already won the widespread approval and preference of foundry men for HannaTen.

A Hanna metallurgist can show you how HannaTen will meet your foundry needs with greater efficiency and more savings for you. Just write, phone or wire the nearest Hanna office.

THE BEST KNOWN HANNA NAME IN IRON

GRADES:
BASIC
SILVERY
FOUNDRY
MALLEABLE
FERRO-SILICON

BRANDS:
SUSQUEHANNA • BUFFALO • DETROIT

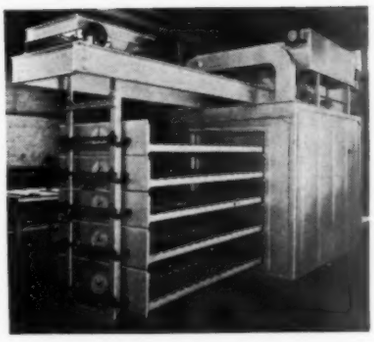
THE HANNA FURNACE CORPORATION

BUFFALO • DETROIT • NEW YORK • PHILADELPHIA • BOSTON

MERCHANT PIG IRON DIVISION OF NATIONAL STEEL CORPORATION

FROM CORES TO FINISHED CASTINGS

YOU INSURE QUALITY of HEAT TREATMENT with GEHNRICH OVENS and ROCKWELL FURNACES



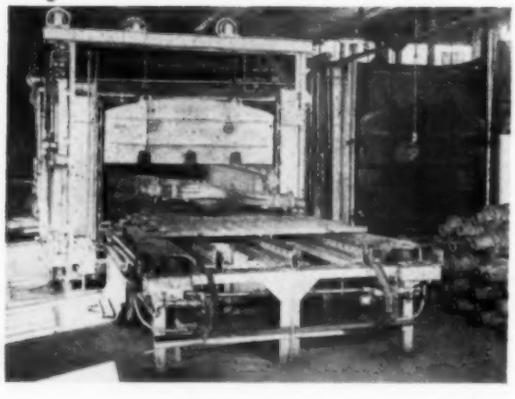
Gehnrich Pull-drawer Oven for core baking or heat treating; heated by gas or oil heater-air recirculation system.

The extensive experience of the Gehnrich-Rockwell organization is your assurance of getting the right oven or furnace for your heating job. Hundreds of installations of Gehnrich Ovens for core and mold drying, low temperature heating or metal finishing, and of Rockwell Furnaces for non-ferrous metal melting or for annealing and heat treating of castings, are doing excellent work in foundries, large and small.

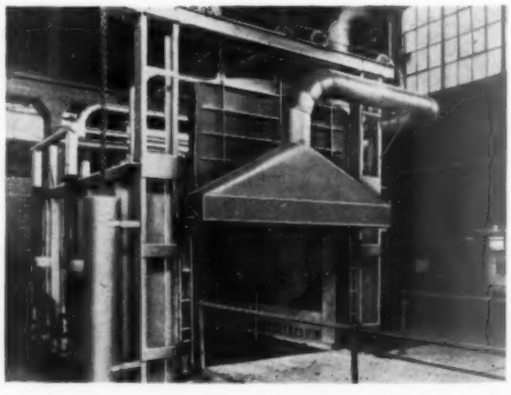
Let us send you our folder of bulletins.

Gehnrich Car Type Mold Oven—single or multiple compartment—assures drying uniformity through internal recirculation heating.

Gehnrich Monorail Conveyor Oven with preheating and baking zones, heated by external gas-fired air heater - recirculation system, for core baking.



Rockwell Pusher-Tray Furnace, gas-fired, for annealing large castings; handling system and heat control entirely automatic, saving labor and improving metal uniformity.

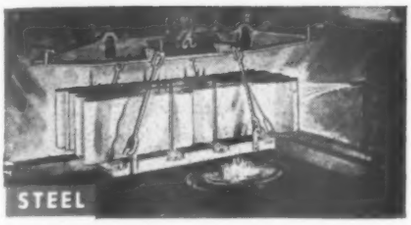


Rockwell Car-Bottom Furnace with oil-fired, bridge-wall heating system for uniform annealing of castings.

GEHNRICH OVENS • ROCKWELL FURNACES

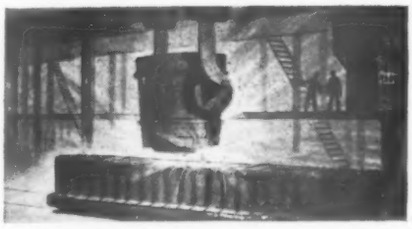
W. S. ROCKWELL COMPANY • 210 ELIOT STREET • FAIRFIELD, CONN.

SPECIFY "GENERAL CHEMICAL"



PICKLING—Sulfuric Acid—Hydrofluoric Acid—Muriatic Acid—Nitric Acid—Phosphoric Acid—Chromic Acid.

Detergents: Sodium Metasilicate—Trisodium Phosphate—Sodium Silicate—Tetrasodium Pyrophosphate.



RIMMING STEEL—Sodium Fluoride for smoother-surface rimming steel.

COKE BY-PRODUCTS—Sulfuric Acid for making ammonium sulphate; also for washing toluene and benzene, and for treating light oils.

quality chemicals for the metal industry

Casting Cleaning Acid (Hydrofluoric Acid)—Sodium Silicate—Zinc Chloride—Polyacid Fluoride—Chromic Acid • Ammonium Fluoborate—Sodium Fluoborate—Potassium Fluoborate, Antioxidants and inhibitors • Potassium Fluoride—Lithium Fluoride and Other Welding Fluxes • Fluoboric Acid: Solvent for silica, in cleaning surfaces.

Sodium Cyanide—Sodium Fluoride—Sodium Cyanate—Potassium Cyanate.

Lead Fluoborate—Tin Fluoborate—Zinc Fluoborate—Cadmium Fluoborate—Copper Fluoborate, etc.

FOR METAL ANALYSES: BAKER & ADAMSON REAGENTS AND FINE CHEMICALS

GENERAL CHEMICAL COMPANY
40 RECTOR STREET, NEW YORK 6, N. Y.

Sales and Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) Buffalo • Charlotte (N. C.) • Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh • Providence (R. I.) San Francisco • Seattle • St. Louis • Utica (N. Y.) • Wenatchee • Yakima (Wash.)

In Wisconsin: General Chemical Wisconsin Corporation, Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

BASIC CHEMICALS
GENERAL CHEMICAL COMPANY
FOR AMERICAN INDUSTRY

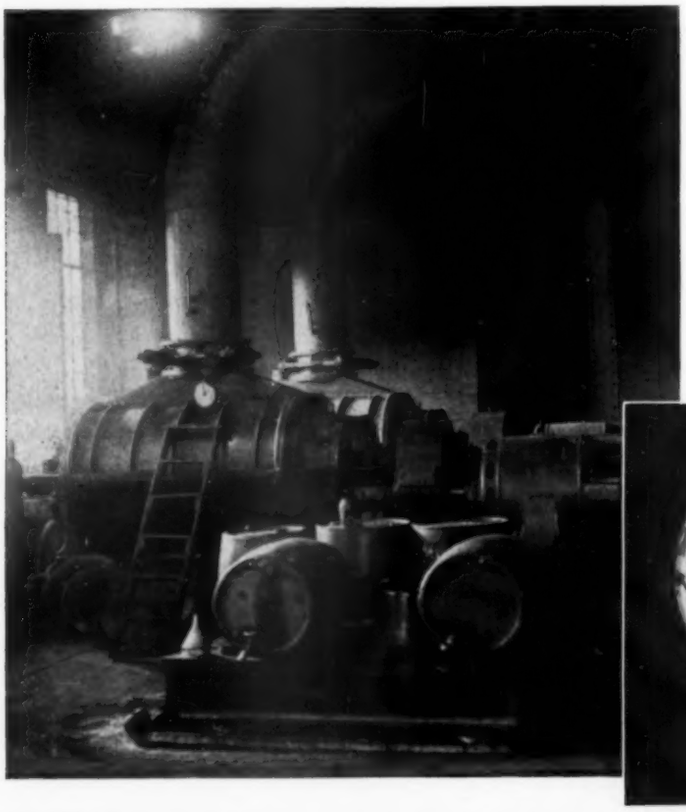
BANISH A FOUNDRY JINX

with Air-Weight Control

BAD WEATHER gets a heavy vote as top jinx of quality and operating efficiency in the foundry. Foxboro doesn't claim to do much about the weather . . . but Foxboro's Air-Weight Controller *can* and *will* help banish rejects and slow-downs, for you, as it has already done for many others. Here's how:

It's just as necessary to weigh the air fed to a cupola as it is to weigh the coke and iron. That's because oxygen must be provided in a definite relationship, by weight, to the other ingredients. Foxboro Air-Weight Control automatically delivers a definite weight of air at a definite rate – regardless of variations in barometric pressure, air temperature, and wind box pressure. Operation and product are both improved.

Leading authorities on foundry practice recommend automatic control of air weight. Consider it for *your* foundry! Write for Bulletin B-268 containing full details of this easily-installed jinx banisher. Ask for names of users in your vicinity. **The Foxboro Company, 32 Neponset Avenue, Foxboro, Massachusetts, U. S. A.** Also Montreal, Canada. Branches in principal cities.

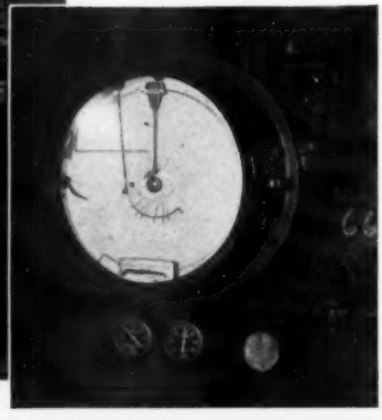


SMOOTHS OUT THE WRINKLES IN CAR WHEEL PRODUCTION

A Mid-West manufacturer of car wheels reports that "operation was much more uniform and rejects cut materially after the installation of a Foxboro Air-Weight Controller."

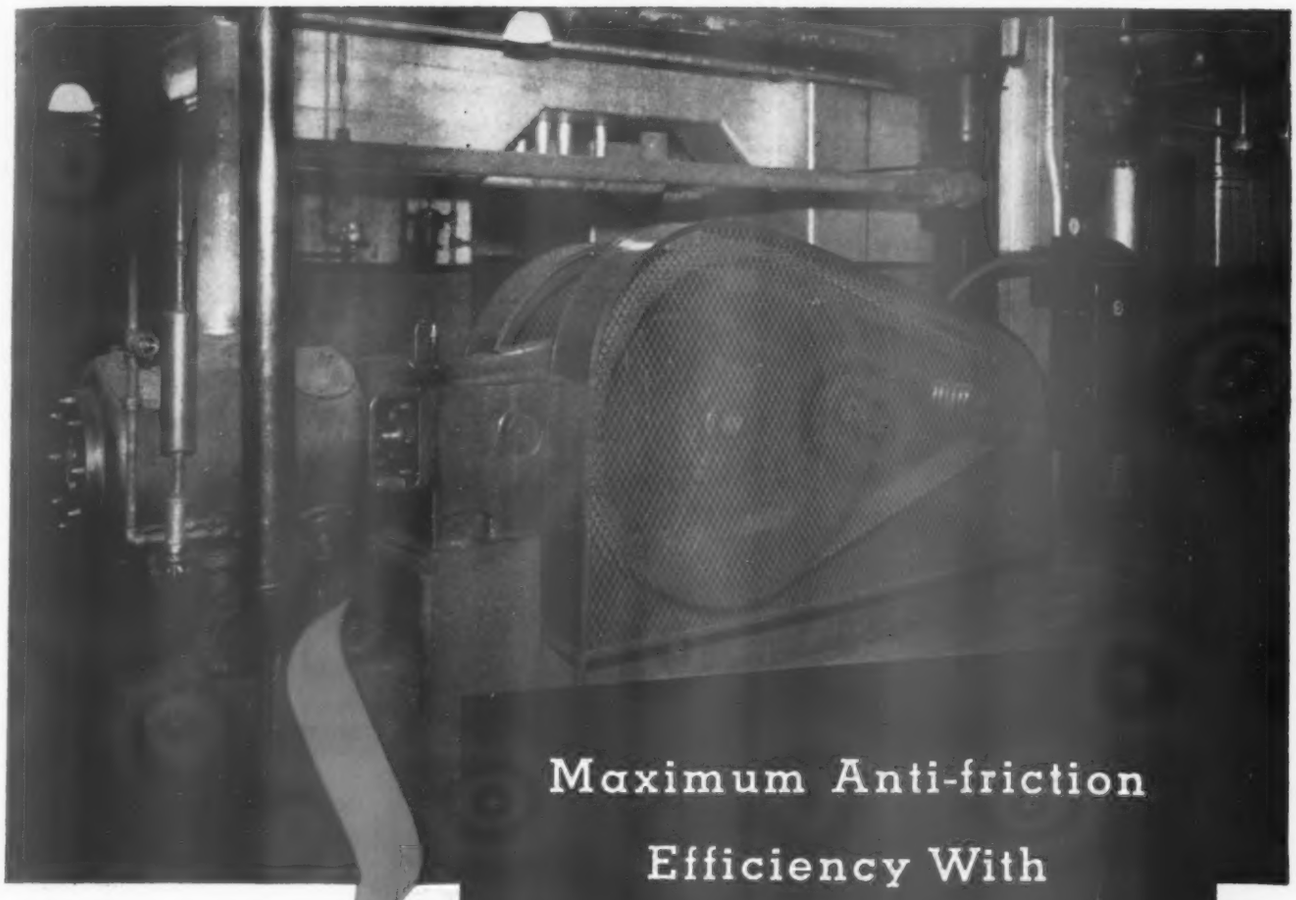
At the left is a photograph showing the blower room of this foundry. Notice the two blowers that discharge into one cupola. Each is used on alternate days. Both are controlled by a single Air-Weight Controller which is piped to permit the use of one orifice plate.

The photograph below shows the Foxboro Air-Weight Controller installation.



Entire installation of Foxboro Air-Weight Controller requires but a few hours work of an experienced pipe fitter.

FOXBORO REG. U. S. PAT. OFF. **AIR-WEIGHT CONTROLLERS**



Maximum Anti-friction Efficiency With TIMKEN BEARINGS

Ingersoll-Rand Type ES Compressor equipped with Timken Bearings

This Ingersoll-Rand 12 x 11 Type ES Compressor—like other types of Ingersoll-Rand anti-frictionized compressors—is equipped with Timken Tapered Roller Bearings.

Timken Bearings have proved to the complete satisfaction of users of Ingersoll-Rand Compressors, that they can be depended upon to provide anti-friction performance at its best, plus rugged endurance under all conditions of compressor operation.

Timken Roller Bearings not only eliminate friction; they also carry radial, thrust and combined loads; and hold moving parts permanently in alignment. It pays to have them in compressors and all kinds of machinery. Make sure you have them in your equipment — and see that the trade-mark "TIMKEN" is stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

2 ways To Quickly Overcome Casting Defects And Eliminate Guesswork . . .

1 USE THE CASTING DEFECT CHART
2 USE SAND TESTING EQUIPMENT

DIETERT CASTING DEFECT CHART

CASTING DEFECT	FINENESS		MOISTURE		PERMEABILITY		GREEN STR'GTH		GREEN
	CAUSE	REMEDY	CAUSE	REMEDY	CAUSE	REMEDY	CAUSE	REMEDY	CAUSE
BLOW	FINE	REDUCE CLAY BALLS AND FINES. INCREASE GRAIN SIZE	HIGH	REDUCE MOISTURE	LOW	REDUCE FINES OR INCREASE GRAIN SIZE TO INCREASE PERMEABILITY	high	reduce clay substance or binders. Increase aeration	
DROP			low or high	control moisture			low	increase clay Bentonite or new molding sand	
SCAB	FINE	INCREASE GRAIN SIZE. REDUCE FINES	high	reduce moisture	low	increase grain size or reduce fines			

MOISTURE TELLER

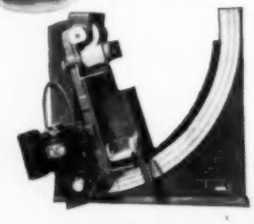
THE CAUSE of a casting defect is not always a singular condition but rather a series of conditions. Frequently, one or more *direct* causes and one or more *indirect* causes collectively cause a casting defect. However, certain conditions might prevail that would make it advisable to alter the indirect causes of a defect and make no alteration to change the direct cause. Very often, alteration of a single indirect cause will change mold conditions sufficiently to eliminate a casting defect.

The types of mold conditions causing various casting defects chargeable to sand and the method of remedy for these defects are tabulated in the CASTING DEFECT CHART. IF YOU HAVE NOT ALREADY RECEIVED THIS CHART, WRITE FOR YOUR FREE COPY TODAY.

PERMEABILITY METER

TEST CORE BAKING OVEN

MOLD HARDNESS TESTER



UNIVERSAL SAND STRENGTH MACHINE

HITEMP DILATOMETER

SINTER METER

RAPID SAND WASHER

★ ★ ★ ★

Prepare all of your foundry sands to definite specifications as measured by sand testing equipment so that the same sand is delivered daily to the molding units.

Write today for information on an economical sand control set-up for your plant.

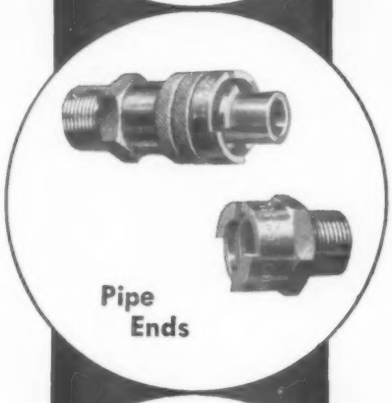
CONTROL EQUIPMENT SAVES TIME

Harry W. Dietert Co.

9330 ROSELAWN . . . DETROIT 4, MICH.

"Dalbo" interchangeable

Couplings and Fittings



DALLETT presents a line of fittings for compressed air lines that are built to "take it." They are interchangeable with similar types, quick-fitting, dependable, pressure-proof, and provide outstanding Dallett safety features. Every Dallett "Dalbo" fitting and coupling is subjected to rigid inspection. They are accepted as the quality standard wherever they have been used.

"Dalbo" couplings and fittings are expertly machined from solid bar stock. They are rust-proof and are completely tight under any pressure upward from 10 pounds. The "Dalbo" locking sleeve prevents accidental uncoupling.

"Dalbo" couplings and fittings, stocked in a number of styles and sizes are available for immediate shipment . . . "Dalbo" couplings are used for oil, gases, and many fluids as well as for air lines.

Write for Bulletin 300

• HOSE MENDERS • AIR HOSE
• BUSHINGS • CLAMPS • MANIFOLDS
• BLOW GUNS

PNEUMATIC DALLETT EQUIPMENT ACCESSORIES

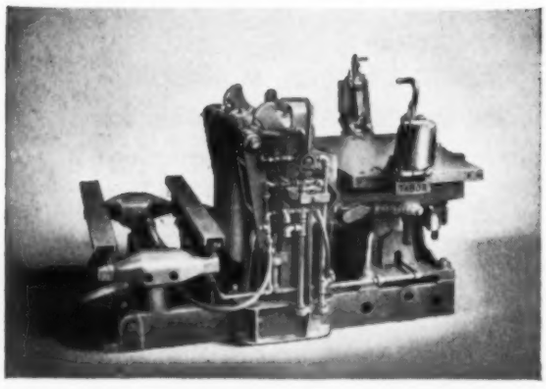
THE DALLETT COMPANY

MASCHER AT LIPPINCOTT STREET, PHILADELPHIA 33, PA.
Manufacturers of Pneumatic Tools and Accessories

30" Shockless-Jar, Rollover and Pattern Draw Machine. 30" x 40" Rollover Plate. 12" Draw.

TABOR
TRADE 1884 MARK

TABOR JAR, POWER ROLLOVER POWER PATTERN DRAW MACHINES



22" Plain-Jar, Rollover and Pattern Draw Machine. 22"x42" Rollover Plate. 10" Draw. Equipped with air-operated Flask Clamps.

Tabor machines handle jobs up to their full rated capacity in a matter of seconds for a complete operating cycle. Ramming time is reduced to a minimum by the efficient Tabor jarring member . . . Rollover is oil controlled for maximum speed with absolute safety . . . Automatic leveling device eliminates possibility of shift . . . Draw is smooth at any desired speed by air-on-oil, and is accurate throughout the life of the machine.

Tabor Jar, Rollover Pattern Draw Machines are furnished in all practical sizes; plain-jar or shockless-jar; with or without air-operated flask clamps. Bulletin 454 illustrates and describes the complete line.

FLASK LIFT MACHINES • SQUEEZERS AND JAR SQUEEZERS • JARRING MACHINES • TABOR-BRASIVE CUT-OFF MACHINES • ROLLOVER MACHINES

Since 1884... MANUFACTURERS OF FOUNDRY MOLDING MACHINES

THE TABOR MANUFACTURING CO.

6225 TACONY STREET **PHILADELPHIA 35, PENNSYLVANIA**

Representatives: Snyder Foundry Supply Co., Los Angeles, Calif.; Gallagher Foundry Supply Co., San Francisco and Oakland, Calif.; Carl F. Miller & Co., Seattle, Wash.

FOR PREDETERMINED MACHINABILITY

IN LARGE OR INTRICATE CASTINGS . . .

it pays to use CHATEAUGAY *Pig Iron*

When specifications call for extensive machining operations, as was true with the tire mold shown above, many cost-wise foundrymen make it a point to use Republic CHATEAUGAY Pig Iron.

Why? Because they know that CHATEAUGAY *consistently* outperforms other irons. From actual experience, they have learned that you can't beat this low phosphorous, copper-free pig iron for milling, drilling, turning or other machining qualities.

Equally important are CHATEAUGAY's other profitable advantages . . . its uniformly fine grain structure and density . . . its strength, toughness and hard, wear-resisting surfaces . . . and its ability to fill the most intricate mold completely.

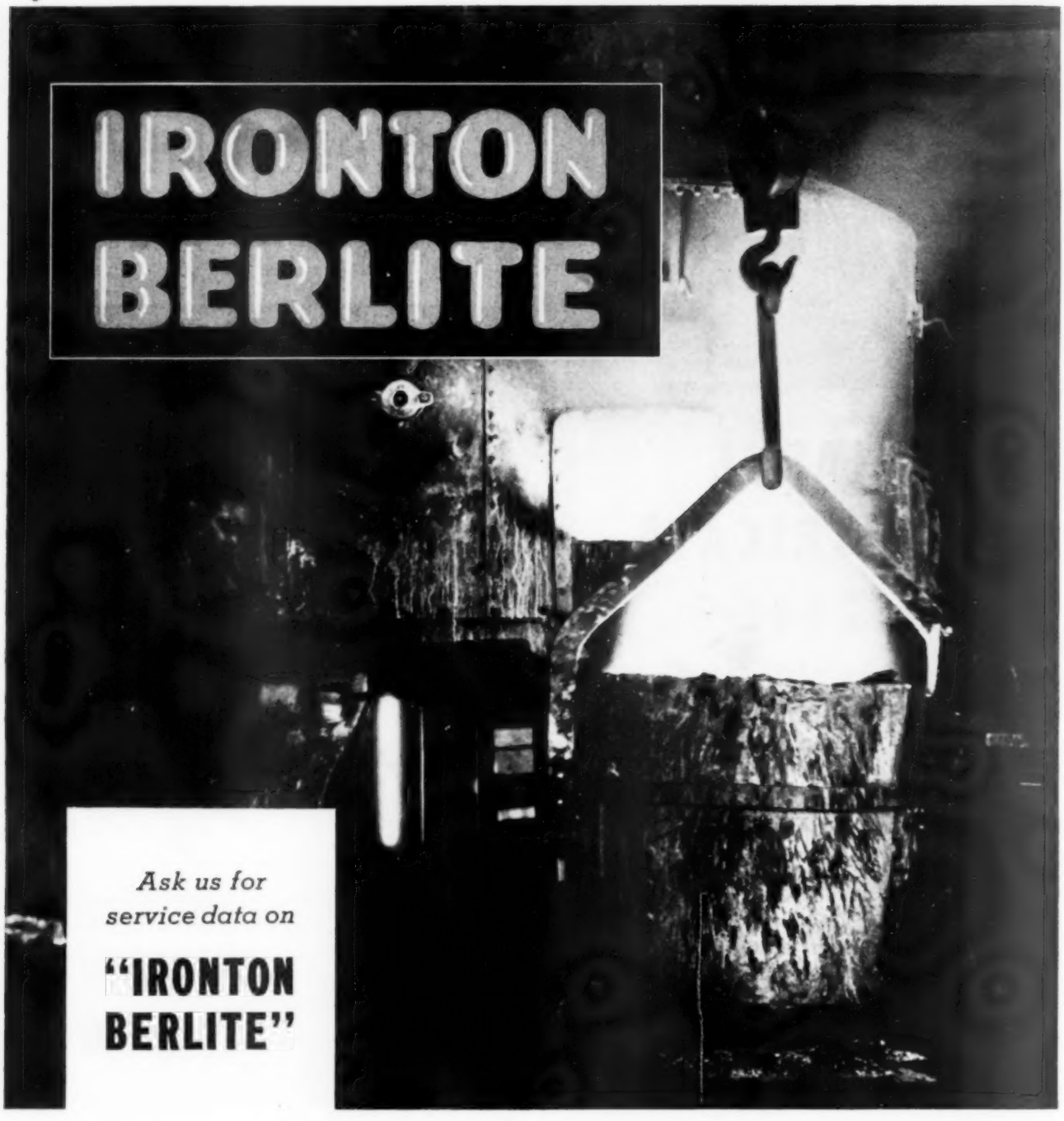
A Republic Pig Iron Metallurgist will give you the complete story about CHATEAUGAY any time you're ready. Write directly to:

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

Republic PIG IRON

"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS



"Ironton Berlite" is the most successful ladle lining material available at this time. Its very high refractoriness, freedom from shrinkage and super resistance to slagging, enables it to last much longer than ordinary ladle mixes. Every foundryman who uses "Ironton Berlite" is enthusiastic about its performance and will recommend it to his friends.

"Ironton Berlite" is a dry, pulverized material. Just mix it with water to the desired consistency and it can be used for either tamped or mud linings in iron foundry ladles. It is also used as a mortar for laying brick in brick lined ladles, and for laying up cupola blocks in the well and melting zone.

THE IRONTON FIRE BRICK COMPANY

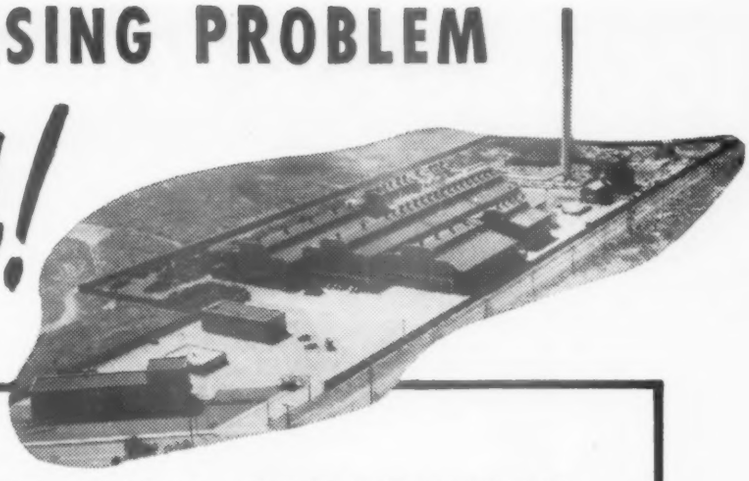
RELIABLE REFRACTORIES

IRONTON OHIO

YOUR PURCHASING PROBLEM

WILL BE

Simplified!



— IF YOU BUY FEDERATED

ALUMINUM BRONZE INGOT
ALUMINUM ALLOYS
ALUMINUM SHOT
ALUMINUM HARDENERS
ALUMINUM SOLDER
ANTI-FRICTION METAL
ANTIMONY
ANTIMONIAL LEAD
ARSENICAL COPPER
BABBITT
"G" BABBITT
"S" BABBITT
BEARING ALLOYS
BODYRITE SOLDER
BRASS AND BRONZE ALLOY INGOTS
"CT" METAL
COPPER ANODES
COPPER INGOTS
COPPER NICKEL SHOT
COPPER SHOT
DEOXIDIZERS (Metallic)
DIE CASTING METALS
  Aluminum—Zinc and Lead Base
GALVOBRITE
  For Zinc Galvanizers
HERCULOY INGOT
  (Silicon Bronze)
LEAD
  Pigs and Ingots
  Caulking
MAGNESIUM ALLOYS
MANGANESE BRONZE INGOT
MANGANESE COPPER
  Shot and Slab
NICKEL SILVER INGOT
PHOSPHOR TIN
SILICON BRONZE
SILICON COPPER
  Shot and Slab
SILVER-LEAD SOLDER
SOLDER (Extruded and Cast)
  Pigs, Bars and Ingots
  Wire
  Ribbon
  Acid Core
  Rosin Core
"ST" SOLDER ALLOYS
SPECIAL ALLOYS
TERNE METAL
TIN
  Pigs, Bars, Ingots
  Wire and Ribbon
TIN PIPE
TYPE METALS
  Linotype
  Stereotype
  Electrotype
  Monotype
ZINC
  Slabs, Ingots, and Anodes
ZINC DUST
ZINC ALUMINUM ALLOYS

Federated
METALS DIVISION
FMD
AMERICAN SMELTING and REFINING COMPANY
120 BROADWAY, NEW YORK 5, N. Y.
Nation-wide service with offices in principal cities

LOOKING FOR SOUND CASTINGS?

Here are two 4-inch Risers from Castings, one made with Foundry G-Iron* and the other with Regular Foundry Pig. In both cases, the mixture contains 40% pig and no steel scrap—Silicon about 2.10% and Total Carbon 3.50%.

REGULAR IRON

Selective freezing over long range of temperature. Photomicrograph—500 Diam.—shows large graphite coarse grain.

TONAWANDA G-IRON*

Quick freezing over short range of temperature. Photomicrograph—500 Diam.—shows fine graphite close grain.

NOTE: Gradual setting from outside rim to center tends to cause internal shrinkage and coarse grain structure.

NOTE: Quick setting with rapid precipitation of finely divided graphite—produces internal pressure causing head to expand—eliminates internal shrinkage—can use smaller riser.

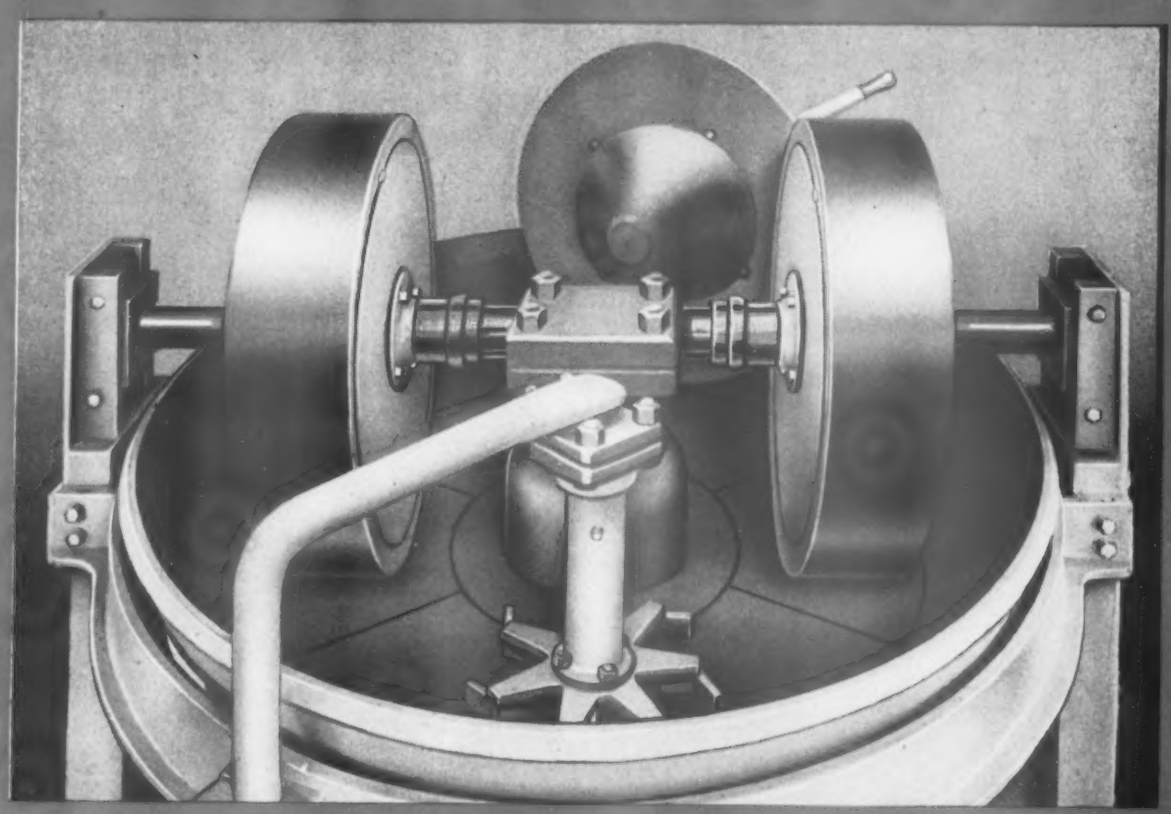
*G-Iron is graphitized pig iron. Manufactured under U.S. and Canadian patents.

TONAWANDA for sound castings

TONAWANDA IRON CORPORATION

NORTH TONAWANDA, N. Y.

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION



THE *Clearfield* REVOLVING PAN MEANS COMPLETE SAND PREPARATION

With the Clearfield revolving pan your sand preparation is continuous. The sand is in constant motion because the movement of the pan imparts a centrifugal force to the sand with the result the sand flies to the side of the pan and is then thrown back toward the center. The action of the scraping disc and the star shaped agitator, which are placed opposite each other, control the flow of sand to the two mullers, likewise placed oppositely.

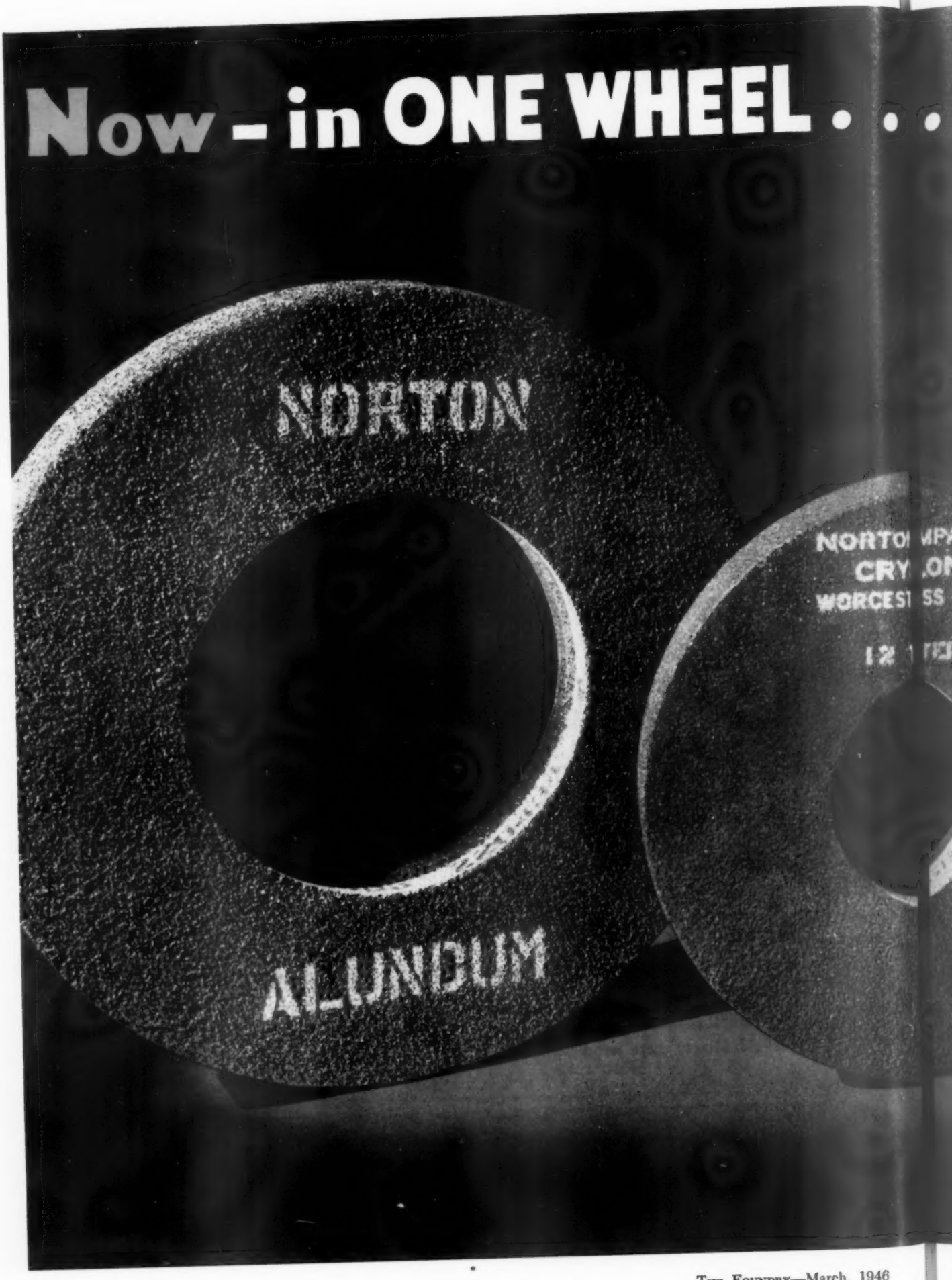
In Clearfield Mixers there is no waste time and you get quicker, more economical, and more complete sand preparation.

CLEARFIELD MIXER

MIXES · TEMPERS AERATES

CLEARFIELD MACHINE COMPANY

CLEARFIELD PENNSYLVANIA, U. S. A.


Now - in ONE WHEEL . . .
NORTON
ALUNDUM

. . fast, smooth cutting action *plus* LONG LIFE!

THE NORTON B-5 RESINOID

IT'S always been easy to supply a wheel that cuts fast—or a wheel that has long life—but not a wheel with both features. Therefore the Norton research laboratories set out to develop an entirely new resinoid bond that would really give both. The result is known as the B-5 and how well it is succeeding is attested by reports from foundry after foundry.

Operators like the Norton B-5 wheel because it stays sharp constantly—cutting fast and smooth. They can get high production with little effort.

Grinding costs are down, too, because the fast cutting action is obtained without sacrifice of wheel life. B-5 bond gives a wheel that is mechanically strong and thereby long lasting.

It will really pay you to try the Norton B-5 Resinoid Wheel in your cleaning room.

NORTON COMPANY, WORCESTER 6, MASS.

Distributors in All Principal Cities

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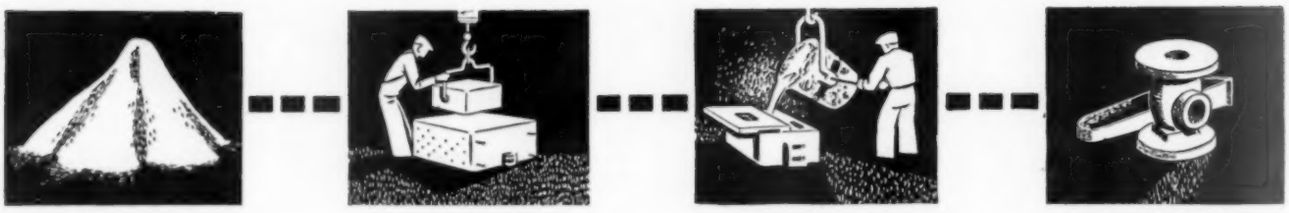
BRIDGE THESE GAPS



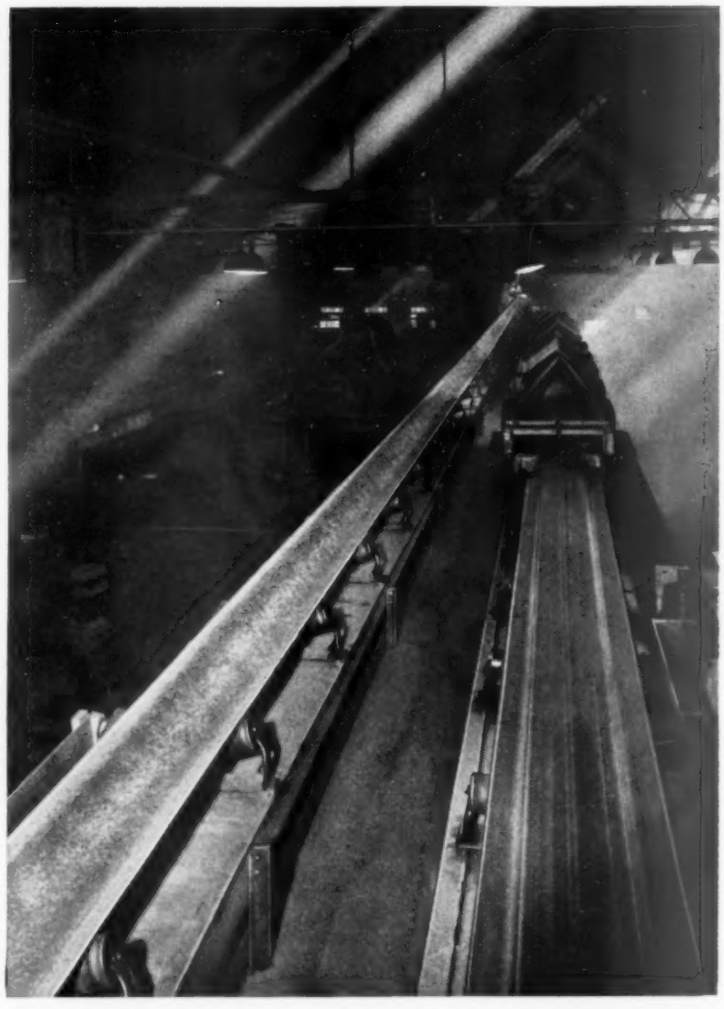
SAND HANDLING — MOLDING — POURING — CASTINGS

TO INCREASE CAPACITY!

You can step up the capacity of your foundry by bridging the gaps between foundry operations with an efficient Rex Conveyor System. The handling and reconditioning of sand . . . the conveying of molds . . . the moving of castings . . . all these steps can be speeded up to provide a continuous flow throughout the entire production cycle.

Through the proper application of Rex Conveyors, you can save floor space . . . increase the output of the individual molder . . . reduce cost per ton for indirect labor . . . cut scrap loss due to sand . . . reduce flask damage and inventory . . . reduce costly hand labor and release many valuable man-hours for other important tasks.

The Rex staff of foundry-trained engineers will be glad to help you design and install a capacity-increasing system for your plant. They study each problem carefully and individually . . . do not apply ready-made solutions or equipment. Why not call on them? They're always at your service.



Tempered sand is plowed off the flat belt on the right to supply the molding hoppers . . . the plows can be seen in the background. The troughed belt on the left carries returned sand to the sand conditioning tower.

REX FOUNDRY CONVEYOR SYSTEMS

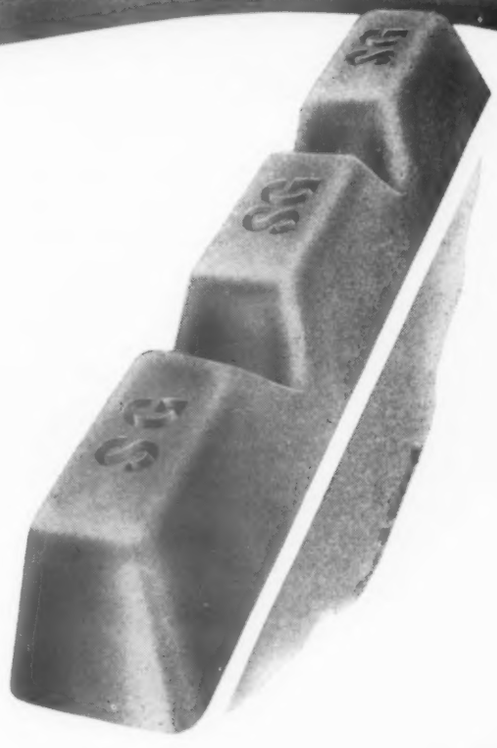
The best answer to most materials-handling problems

CHAIN BELT COMPANY OF MILWAUKEE • 1671 W. Bruce Street, Milwaukee 4, Wis.

Specify S-G Aluminum ALLOY INGOT

We are in a position to supply your needs for Aluminum Alloys in any quantity. Meeting delivery dates became second nature to us during the hectic years of top war production . . . We have not let down . . . Our organization is still geared to producing top quality aluminum alloys to specifications—*your specifications.* Producing these alloys under strictest laboratory control assures the uniformity necessary to eliminate many costly casting problems.

Whatever your needs may be, let's talk them over. Quality, quantity and prompt delivery of Aluminum Alloy Ingot are yours for the asking.



SONKEN-GALAMBA Corporation

MEMBER ALUMINUM RESEARCH INSTITUTE

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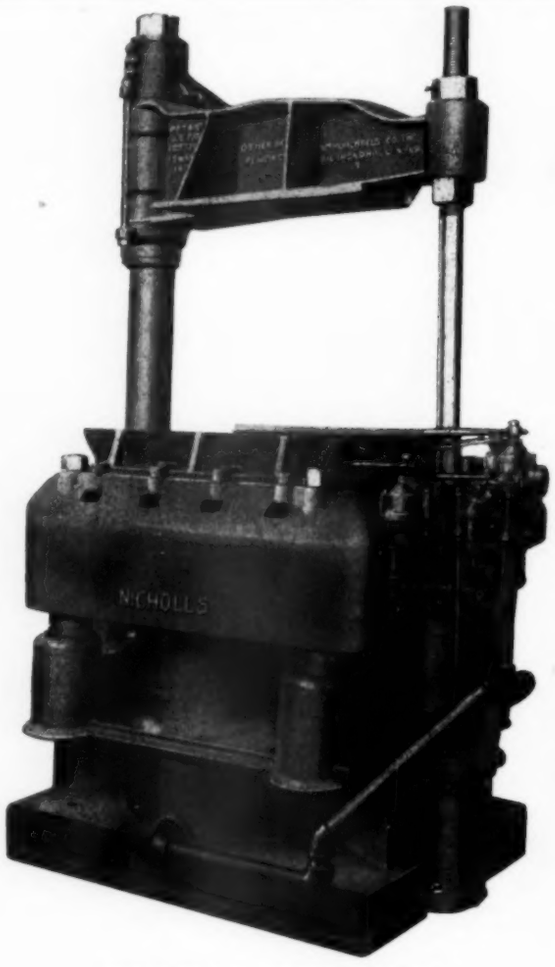

33-54 TYPE "D" MOLDING MACHINE
33" Squeeze Piston 13" Jolt Piston

A Flask Roll-Off Attachment is available as an extra accessory

Heavy Duty Molding Machines

GUARANTEED WORKMANSHIP—

Smooth, sensitive operation is built into all moving parts of Nicholl's Molding Machines by expert mechanics skilled in their specialized tasks. Close tolerances are made possible by a system of accurate jigs and fixtures.

PERMANENT ALIGNMENT—

The main support base with its brackets, cylinder and upright bearings are all cast in one piece for rigidity to avoid mis-alignment and loose parts from constant jolt and squeeze operations. The overhead cross arm and the squeeze head are braced with heavy ribs and supported by an outboard bearing. This design maintains permanent alignment and provides an equalized squeeze. The entire assembly swings by pneumatic power on double roller bearings. The control is combined with the others at the front of the machine handy to the operator.

Can also be equipped with Push-Button Control for all operations, including Automatic Jolt and Squeeze Timing.

Illustration at right gives close-up rear view of heavily braced squeeze head showing pneumatically powered cylinder mechanism.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL, LONG ISLAND, NEW YORK

Established 1910

Foreign Manufacturers and Selling Agents—
For Continental Europe and Great Britain—The George Fischer Steel and Iron Works, Schaffhausen, Switzerland

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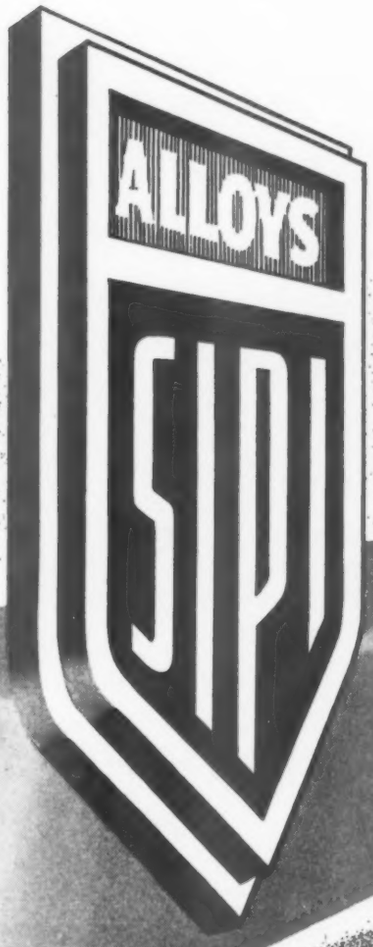

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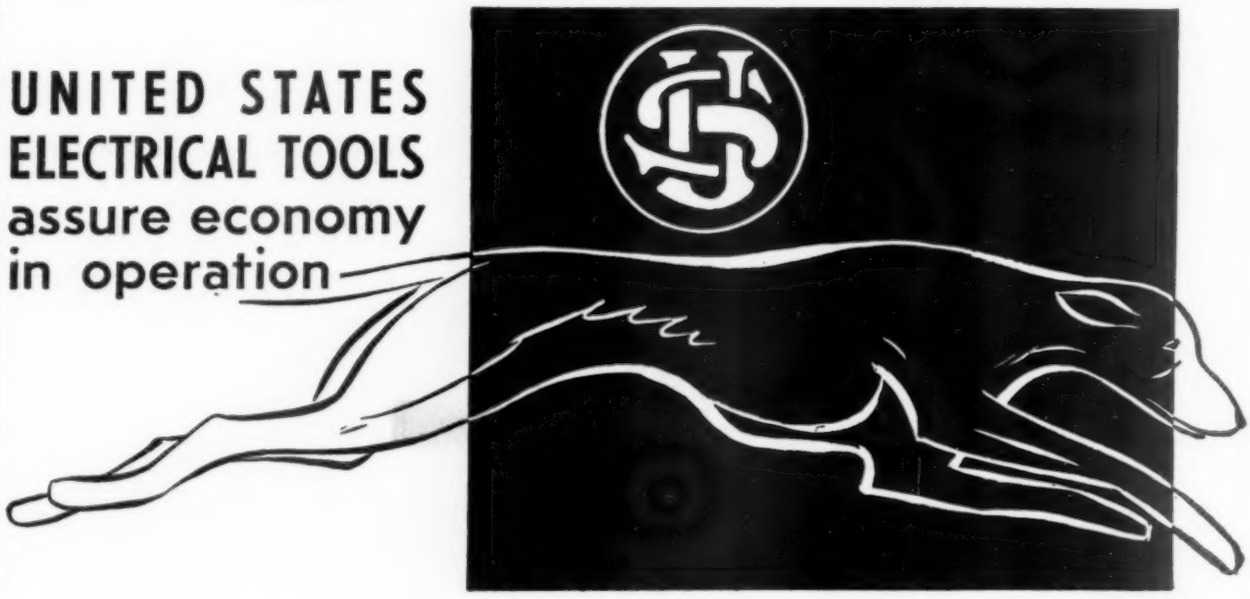
UNITED STATES ELECTRICAL TOOLS assure economy in operation



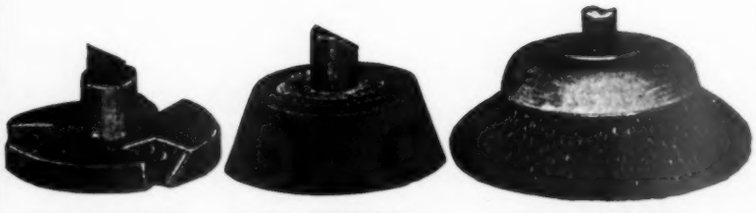
Lithe of line as a greyhound . . . . and as speedy . . . . sweet running . . . . long-lasting . . . . without unnecessary parts to cause extra maintenance or replacement costs . . . . ruggedly strong for unhesitating and unvarying performance.

SUPER-SERVICE SURFACER
Model SU9

Exceptionally powerful machine designed and built for heavy duty sanding, gouging, right angle grinding, planing or rubbing operations. Streamlined design with straight line ventilation which prevents clogging and assures cool motor operation. Air outlets divert dust-laden air away from operator.

THE *United States* ELECTRICAL TOOL CO.

CINCINNATI 14, OHIO



FOR PLANING FOR GRINDING FOR SANDING

"Our Foundry Was Making 24,000 Castings a Day with Fewer Than 80 Rejects!"*

Rejects Were Cut from 13,000 to 80 With the Use of Cities Service #5 Delco Core Wash!

. . . . that is the record one Chicago area manufacturer was able to establish.

In the five years we have served this foundry they have used millions of pounds of #5 Delco Core Wash and are today the same enthusiastic boosters of Cities Service engineering service they were when we first worked with them to get a core of superior smooth finish.

If you are making aluminum, brass or light metal cores be certain to give Cities Service #5 Delco Core Wash a try.

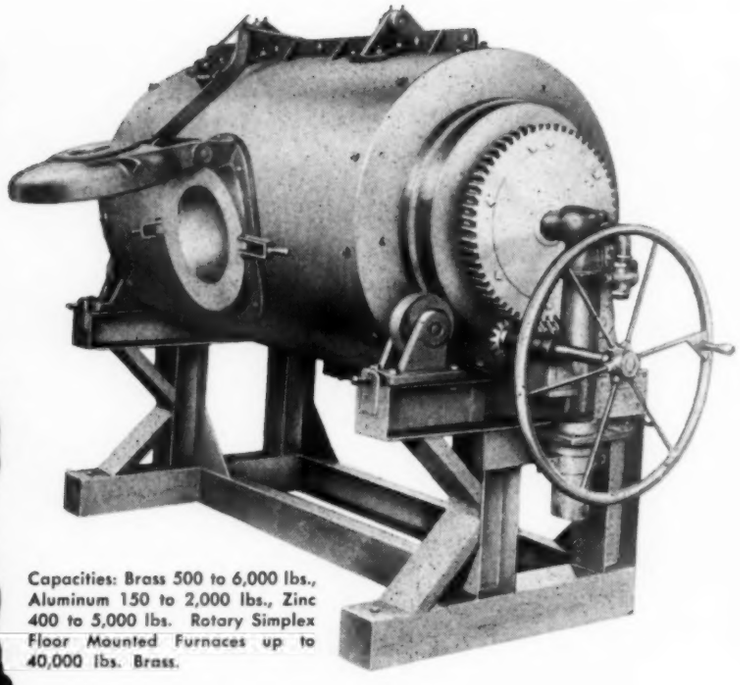
*Name furnished on request

CITIES SERVICE

HERE ARE THE DISTINCT ADVANTAGES of the *Fisher* SIMPLEX MELTING FURNACE

1. Greater capacity is available since the metal is held by the lining of the furnace itself.
2. Direct flame contact with the charge results in faster meltting.
3. Furnace is rotated at intervals to bring hot lining beneath metal bath, resulting in greater fuel efficiency.
4. Heat loss is less because the charging and venting neck is the only opening in the furnace.
5. Pouring can be positively controlled by rotating the furnace with hand-wheel. Motor rotating mechanism is optional.
6. Furnace is split longitudinally to facilitate relining with fire brick or ramming material. Special shapes for neck and burner tunnels are available.
7. Larger castings can be made with only one pourina due to the capacities offered by the Simplex Furnace.

The Simplex is the equal of any open flame furnace for non-ferrous metal melting, is more convenient than a reverberatory furnace and produces a fine quality metal. It is widely used by foundries and smelters and in permanent mold and diecasting plants for remelting and hot charging. Write for Bulletin 28A.



Capacities: Brass 500 to 6,000 lbs., Aluminum 150 to 2,000 lbs., Zinc 400 to 5,000 lbs. Rotary Simplex Floor Mounted Furnaces up to 40,000 lbs. Brass.

The Simplex Open Flame Furnace has been manufactured continuously for many years and will be found in service not only in the United States but in remote localities throughout the world. The Simplex Furnace was formerly manufactured by the Monarch Engineering and Manufacturing Company of Baltimore, Md. prior to purchase of the Monarch business by the Fisher Furnace Company in 1944. The design of the furnace was improved from time to time by Monarch and has been further modernized by Fisher. The present construction of the furnace is illustrated by the above photograph.

Fisher also manufactures a wide selection of stationary and tilting furnaces for crucibles and iron or steel pots. Ask for Bulletin 550.

5519 N. WOLCOTT AVENUE, CHICAGO 40, ILLINOIS.

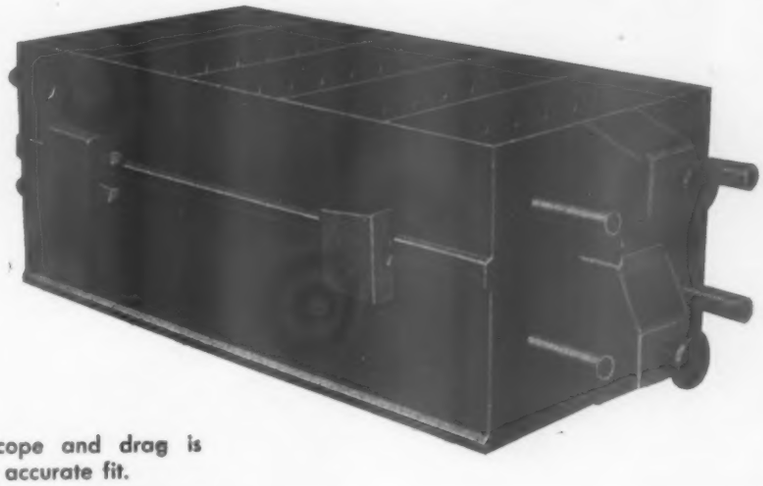
Fisher FURNACE COMPANY

Engineers and Manufacturers

PROMPT DELIVERY

on "Industrial" Fabricated

Steel Flasks and Slip Jackets



★ *Parting Line* on cope and drag is surface-ground for accurate fit.

★ *All-Welded* construction from hot-rolled steel plate.

★ *Custom-built* to your specifications.

SLIP JACKETS

Accurate and light weight, you will find our slip jackets durable and made as you specify.

We have been supplying custom-built flasks and jackets to the automotive foundries in Michigan for some time . . . now offer to the foundry trade our facilities and specialized "know-how." Our equipment is precision-made from best materials to your specifications. An "Industrial" flask is your best assurance of good work and long life under the toughest foundry conditions. For good delivery and good construction, write, wire, or phone *Industrial Fabricating, Inc., Eaton Rapids, Michigan.*

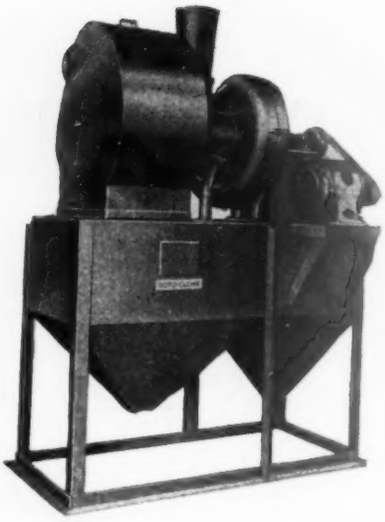
We invite your inquiry—send us your blue prints and requirements and we'll gladly quote you prices and delivery dates.

INDUSTRIAL FABRICATING, Inc.

TELEPHONE 6781

817 HALL STREET EATON RAPIDS, MICHIGAN

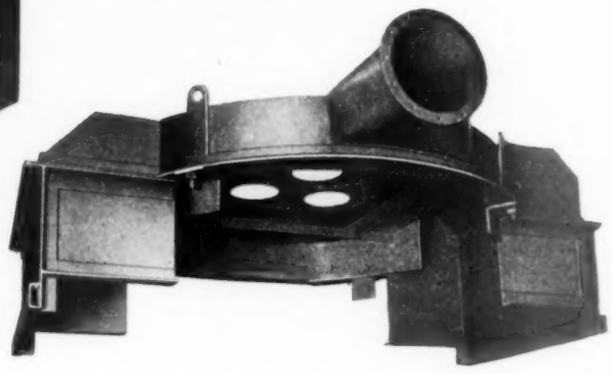
Foremost IN FOUNDRY DUST ENGINEERING

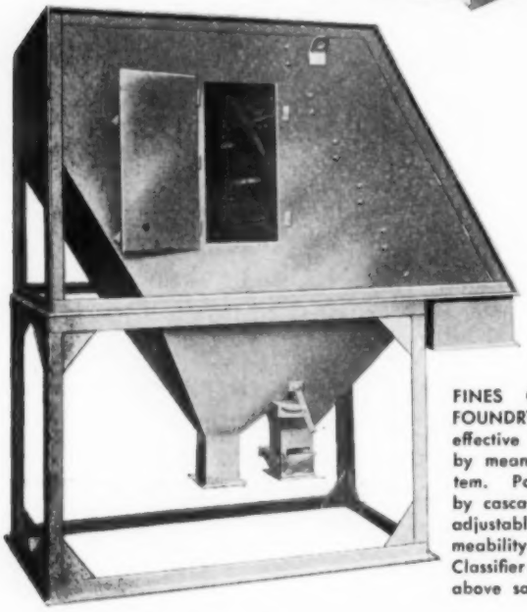


TYPE D ROTO-CLONE WITH SKIMMER PRECLEANER provides a two-stage dry centrifugal arrangement, capable of handling heavy loads of abrasive material with high dust separating efficiency.

ROTO-CLONE TYPE N is designed to meet special requirements of magnesium dust control and ideally suited to all buffing operations. Small Type N units may be located directly in back of grinding or polishing stand. Material collected with high efficiency and stored safely under water.

ELECTRIC FURNACE EXHAUST HOOD is a patented method of applying local exhaust to electric furnace fumes. Designed to fit individual requirements, free from interference with charging and pouring.





FINES CLASSIFIER FOR FOUNDRY SAND provides effective removal of fines by means of exhaust system. Positive separation by cascade action, quickly adjustable for varying permeability requirements. Classifier is usually mounted above sand storage.

The application of Roto-Clone dust control to foundries embraces every operation where dust is either a hazard or a nuisance. Several new Roto-Clone designs and ingenious methods of application, based on extensive experience in foundry practice, are shown on this page. Roto-Clones are available in three types—Type W, the Wet Dynamic Precipitator for general foundry dust control, particularly shakeout, sand conditioning, and abrasive cleaning; Type D, the Dry Dynamic Precipitator for grinding, snagging, portable and swing frame grinders; and Type N, the new Hydrostatic baffle type wet collector. Send for free Bulletins.

TYPE W ROTO-CLONE

AMERICAN AIR FILTER COMPANY, INC.

266 Central Avenue, Louisville 8, Kentucky • In Canada: Darling Bros., Ltd. Montreal, P. Q.

ROTO-CLONE

FOR FOUNDRY DUST CONTROL

HOWARD craftsmen and facilities are available to produce quality wood and metal patterns.

HOWARD craftsmen thoroughly understand foundry practices.

HOWARD patterns are engineered to fit your foundry requirements.

HOWARD modern facilities include two three-spindle type Keller Duplicators which are available for all types of metal duplicating work.

HOWARD FOUNDRY CO.

Pattern Division

General Office 4900 Bloomingdale Ave.

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The Very Latest

TWO MINUTE VOLUMETRIC CARBON DETERMINATOR

from the company that

SPECIALIZES IN CARBON ANALYSIS

Having introduced the original determinator, watched it grow, developed the refinements that make it trouble-free, we now introduce Model No. 6000, *the last word in carbon determination.*

LOOK FOR THESE FEATURES

1—Instant reading because of the amazing, new light refraction illumination.

2—New principle absorption bulb that eliminates absorption "bugs".

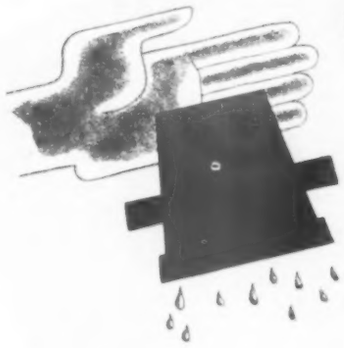
3—Flexibility and ease of handling that decreases human error.

For "First With the Latest" look to

LABORATORY EQUIPMENT CORPORATION

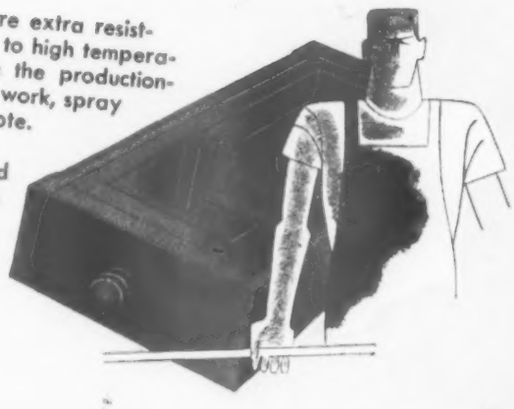
BENTON HARBOR, MICHIGAN

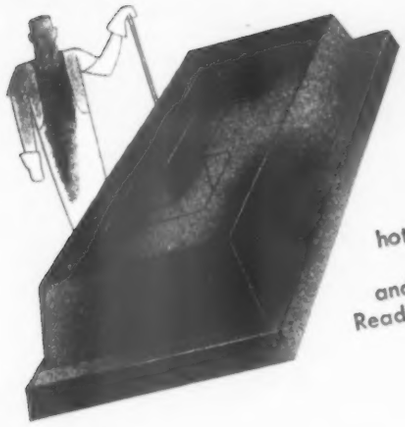
3 foundry blackings to meet your needs



cordip For dipping or spraying dry or green sand cores on light production work—it pays to use Cordip. Simple to prepare, easy to use, Cordip comes in powdered form complete with binder. Add water and apply— 20° Beaume for spraying, 35° Beaume for dipping. Will not build up or run on core surfaces. Holds true core dimensions and penetrates sand to prevent burning in.

mexacote Where extra resistance to high temperature metal is demanded in the production-casting of light and medium work, spray molds and cores with Mexacote. Quickly mixed with water to paste consistency, then thinned for spraying. Mexacote forms a firm coating that will not crack, shrink, scab, peel, or buckle under heat, can be dried by torch or lamp.





No. 172 blacking A high quality wet blacking for cores and dry sand molds, No. 172 Mexican Blacking is easily and smoothly applied with swab, brush, or spray. Turns the hottest iron and allows sand to peel cleanly, making it ideal for medium, extra large, and pressure castings weighing 1 to 25 tons. Ready mixed with bond, requires only water.

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICHIGAN

New AIR HOIST

1/4 and 1/2 TON CAPACITY

Great Time-Saver in Foundries

The new Keller Air Hoist is small but powerful! Weighs only 30 pounds . . . less than half the weight of the ordinary portable ¼-ton and ½-ton hoist. Lifting capacity is 1000 pounds at a rated speed of 17 feet per minute . . . lesser loads at proportionately greater speeds.

It fills a long-felt need in the foundry. One man can carry it easily from place to place, set it up, and control its speed with one hand on the sensitive control bar.

Variable speed, from slowest creep to maximum speed of 17 feet per minute, makes positioning of any load easy. In foundries, the cope can be inched down on the drag smoothly, without jarring.

Special built-in safety features are noteworthy . . . safety stops, alloy steel roller chain, drop-forged swivel hooks, completely enclosed mechanism. All hazards from dust are eliminated as the hoist is air operated.

THIS BULLETIN GIVES COMPLETE DATA

Send for a copy of this new illustrated bulletin. It completely explains the 11 design features and the 7 work-saving advantages. It also gives complete specifications with instructions on how to order.

Write for it today

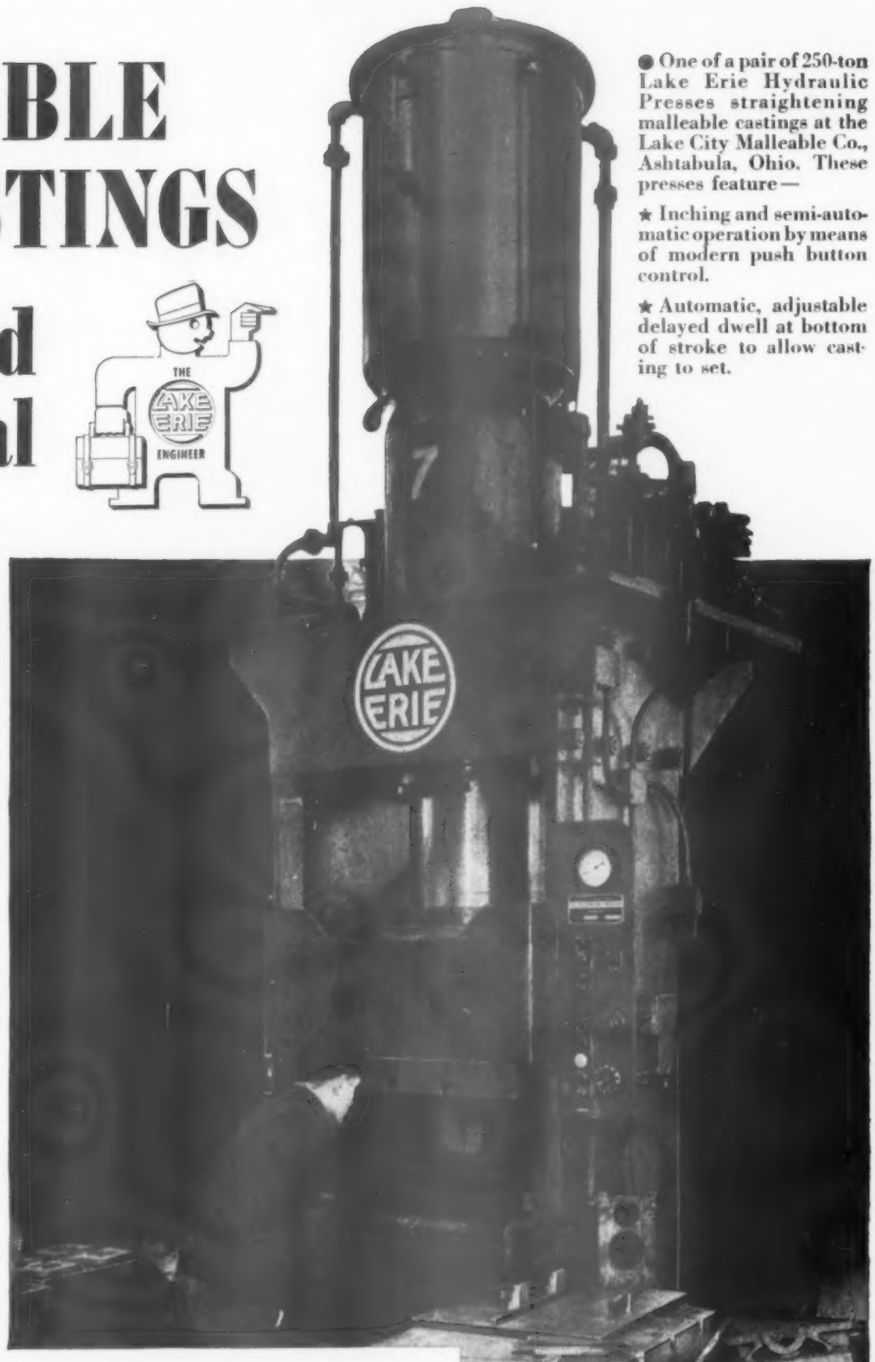
KELLER

PNEUMATIC TOOLS

KELLER TOOL COMPANY • 4601 Lake St. • Grand Haven, Mich.

CASE HISTORIES PROVING THE POWER OF THE PRESS

MALLEABLE CASTINGS ... fast and economical



● One of a pair of 250-ton Lake Erie Hydraulic Presses straightening malleable castings at the Lake City Malleable Co., Ashtabula, Ohio. These presses feature—

★ Inching and semi-automatic operation by means of modern push button control.

★ Automatic, adjustable delayed dwell at bottom of stroke to allow casting to set.

The Lake City Malleable Company, Ashtabula, Ohio, reports that its Lake Erie Hydraulic Presses are "...fast on production...turn out high quality work...give dependable performance...and are low on maintenance costs." These favorable experiences of the Lake City Malleable Company are typical, because Lake Erie Hydraulic Presses are designed and built to bring you these important advantages:

- Full automatic and semi-automatic operation increase production... bring production costs down.
- Quick, easy set-up cuts idle time to a minimum... saves money... gives an extra boost to production.
- Precision pressure control and accurate timing produce products of uniform high quality...reduce rejects...save waste.
- Built-in dependability keeps Lake Erie Hydraulic Presses going... keeps production rolling.

Lake Erie Engineering Corporation is equipped through long years of experience to meet your hydraulic press requirements exactly...quickly ...usually with a standard model... but with a special model if necessary. Let us know your requirements... consult us today.

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LAKE ERIE ENGINEERING CORP.
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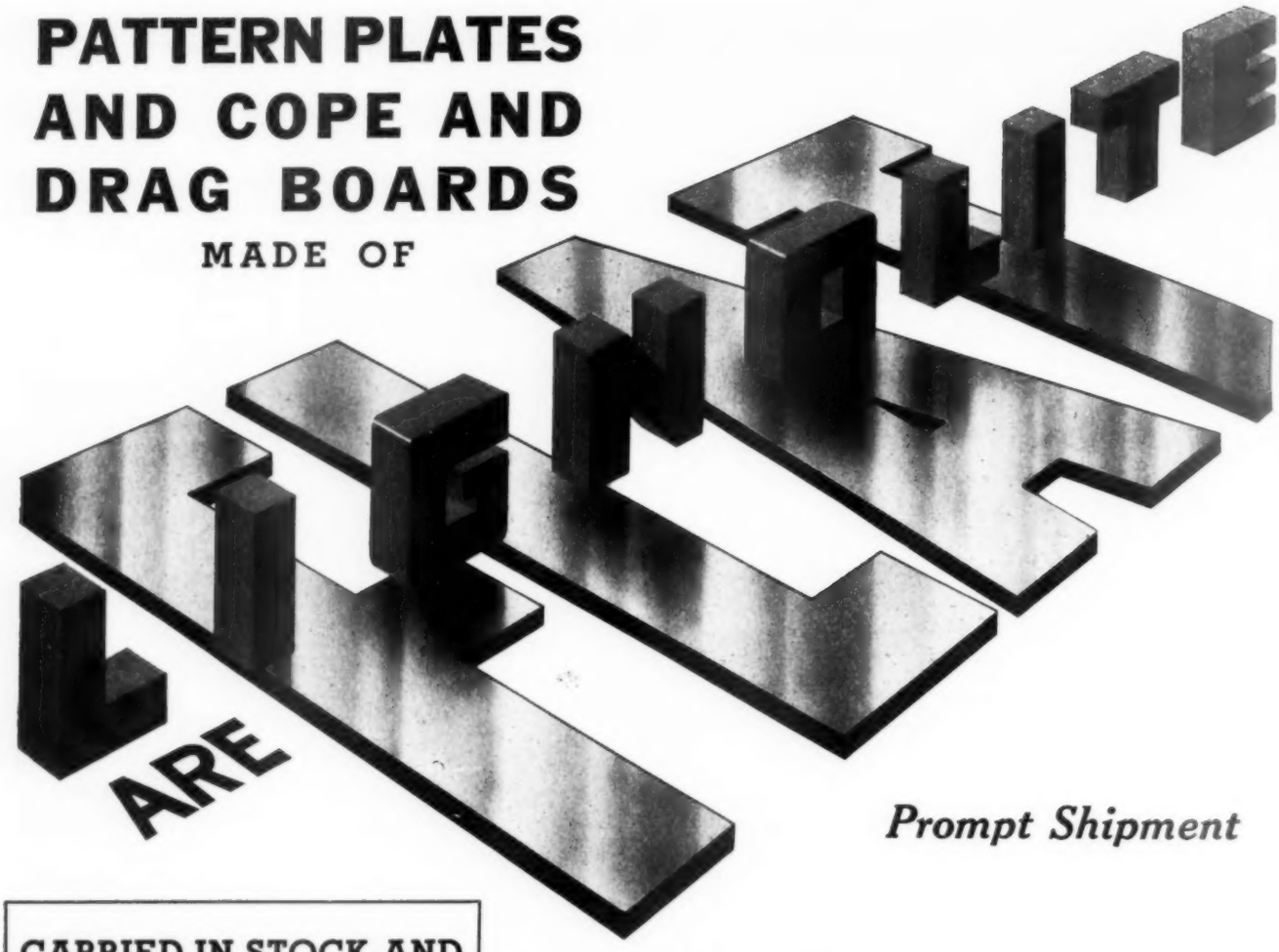
● Leading manufacturer of hydraulic presses...all sizes and types...metal-working—processing—plastic molding—rubber vulcanizing—stereotyping—special purpose.

PATTERN PLATES AND COPE AND DRAG BOARDS

MADE OF



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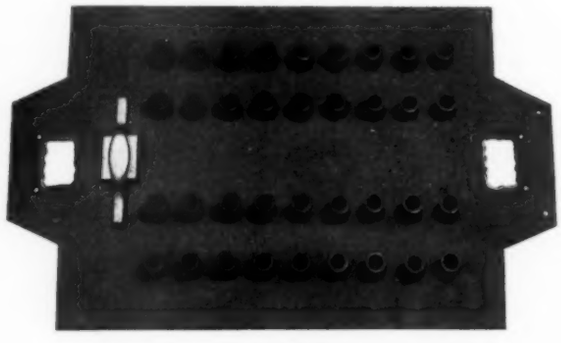
● They stay flat because LIGNOLITE has high transverse strength and resistance to deflection. It is impervious to moisture and does not warp from contact with wet sand or high humidity. LIGNOLITE is half the weight of aluminum, is abrasion proof, of uniform caliper, and may be easily machined, sawed, drilled, tapped. Available in all flask sizes 7/16″ to 2″ thick or in sheets for own cutting. Write for sample and complete information.



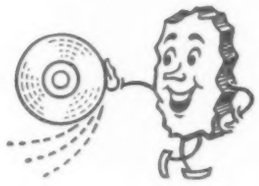
Mounted LIGNOLITE Pattern Plate

MARATHON CORPORATION

CHEMICAL DIVISION — **ROTHSCHILD, WISCONSIN**

When you use SM Ferrochrome as a ladle addition to cast iron

You get these advantages of chromium:



. . . improved wear resistance

. . . increased resistance to heat

. . . better physical properties

---

and at less cost

than with ordinary ferrochrome, because SM Ferrochrome gives higher chromium recoveries. Since it dissolves faster than ordinary ferrochrome:

. . . larger ladle additions of chromium are possible
. . . chromium is evenly distributed throughout the metal

If you are making chromium cast iron, you will find SM Ferrochrome economical and reliable. If you wish further information on chromium irons, write for the booklet, "Chromium in Cast Iron."

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

ELECTROMET Ferro-Alloys and Metals
are sold by Electro Metallurgical Sales Corporation, and
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Trade Mark
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"Electromet" and "SM" are trade-marks of Electro Metallurgical Company

• ACME ALUMINUM ALLOY CASTINGS

THERE'S nothing better than aluminum for washing machines. Aluminum is light—easy to handle, easy to move, resists corrosion. Aluminum helps give washing machines better operation, longer life, lighter weight.

Then how about *your* product? Couldn't it, too, make use of these advantages? And, besides, aluminum machines easily—and is readily cast into intricate shapes. Wartime progress has made aluminum alloys even stronger than before.

Why not ask Acme about the advantages of "aluminizing" your product? Acme engineers have spent many years of work and study on aluminum and its alloys. And they are always glad to lend a hand in any problem of design.

Acme Aluminum Permanent Mold (and Sand) Castings are produced in one of the largest, newest and best-equipped foundries in the United States. Consult Acme on your castings problems, without obligation.

ACME ALUMINUM ALLOYS, INC.

DAYTON 3, OHIO

Patterns · Tools · Aluminum, Brass, Bronze Castings · Engineering

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Chicago: Metal Parts & Equipment Co., 2400 W. Madison Street, St. Louis: Metal Parts & Equipment Co., 3615 Olive St.

Let's Pay More Attention To Would-Be Customers

THE deluge of orders which descended upon ferrous branches of the foundry industry in recent months probably should not be considered a complete stroke of good fortune. Unless those in charge of public and customer relations in each foundry realize fully the many pitfalls that exist in the present situation, this bonanza may backfire to the detriment of the foundry industry as well as the individual companies producing gray iron, malleable iron and steel castings.

Present demands for ferrous castings for civilian goods and machines are tremendous. Recent surveys show that 90 per cent of all metalworking plants use castings as engineering materials. These plants, along with municipalities and other direct users of cast products, have developed needs for castings far beyond the ability of foundries to produce under present conditions. While foundrymen still are handicapped by an acute shortage of workers—the Civilian Production Administration recently estimating that the gray iron industry alone needs 40,000 additional workers—it is doubtful if present demands for ferrous castings could be met on schedule if all foundries had enough workers and essential raw materials to operate at full plant capacity.

As a result of inflated demands, users of castings frequently have encountered considerable difficulty in finding sources of supply and in obtaining delivery of castings in satisfactory volume. These manufacturers have told would-be purchasers of machinery and other products that their wants cannot be satisfied because of a "shortage of castings." Until the strike epidemic grabbed the spotlight as the brake on recovery, the general public was led to believe that foundries provided the greatest drag on rapid reconversion. Perhaps the industry needs a more intensive program of public relations.

But the gravest danger concerns the matter of customer relations. Reports from various sources indicate that all too many foundrymen are pursuing a shortsighted policy in handling the tremendous volume of inquiries now in circulation. Some are using poorly prepared form letters; others are not even acknowledging these requests. Surely a desire to build goodwill for one's company should provide the incentive for the individual handling of each inquiry, regardless of cost and effort.

Industrial production in the years immediately ahead will be marked by terrific conflicts between materials—one metal against another, and metal against plastics. At the same time the various processes of fabrication will be in competition, with castings, forgings, stampings, weldments, powdered metallurgy, spinning and other methods fighting for a fair share of the available business. Manufacturers who are unable to buy castings for present needs may be driven to the use of other types of components. Foundrymen should remember that without intelligent handling much of the business lost today may not return to castings when the production situation improves.

Frank G. Steinebach
Editor

Converter

In this first of a series of three articles discussing use of the converter in making steel for castings, the author describes general procedure in operating the unit and the influence of silicon oxidation in raising the molten metal to a high temperature during the blow

By JOHN HOWE HALL
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Process in Steel Foundries

ALMOST from the beginning of the steel casting industry, converters in steel foundries have been used chiefly, if not wholly, for making small, light-section castings. For heavier pieces, open-hearth steel was more satisfactory. It was readily made hot enough to "run" the medium-sized castings, and being produced in comparatively large heats, it would also take care of the big jobs. Open-hearth steel, especially acid steel, could easily be made of a quality that did not liberate gas on solidifying, so that sound castings were produced. The steel made in the larger converters, on the other hand, tended to be somewhat wild and to produce castings with many blowholes.

Very light castings, however, were never produced satisfactorily from open-hearth steel. The temperature of the metal might be high enough to run the first castings poured, but it required so long to pour a large heat into small work that the steel grew too cold to flow in the molds. Also, the large open-hearth ladles could be poured only through a stopper and nozzle. The high velocity of the stream and the large amount of steel discharged through a nozzle are unsuited to pouring small pieces direct from the ladle, since such a heavy stream tends to wash away the sand of the molds. Filling light ladles from the large ones by means of a nozzle was unsatisfactory, due to loss of temperature, and to fill the small ladles over the lip of the large ones was impossible. All in all, the open-hearth furnace of ordinary size was a most unsatisfactory means for making steel to be poured into small castings and efforts to develop successful small open-hearth furnaces have usually ended in failure.

Converter Produced Hot Steel in Small Lots

The converter, especially the small converter, had the advantage that it produced very hot steel in small lots at short intervals. Because of the high temperature of the metal, it was comparatively easy to pour off all the steel before it grew too cold to run the molds. The small lots sent to the pouring floor at short intervals were readily disposed of, first at one part of the foundry, then at another, without holding up molding while a large heat was handled.

Therefore, the converter in its early days had only the crucible process to compete with. The latter made hot steel that would run light castings readily, but crucible steel was generally rather hard, the carbon seldom being under 0.50 per cent, and the cost of the metal was very high. Well-made converter steel obviously had an advantage over crucible steel for small castings, and was rapidly displacing crucible steel in American shops in the early part of this century. (*Please turn to page* 221)

PREVENTING GRAY IRON Surface

Fig. 1 (above) — Effect of ferrostatic pressure on metal penetration. Cope height of motor bracket casting at left 11 in.; cope height of right-hand bracket 15 in. Penetration was eliminated at lower ferrostatic head
Fig. 2 (left)—Test cylinders, 5-in. dia, cast to show ferrostatic pressure effect. Heights of five cylinders, left to right, 1/2, 3/4, 1, 2, 3 in. Cope heights A—5 in.; B — 13 in.; C—20 in. Mold hardness readings 75-90. Note disregard of metal penetration for section size

ce Roughness

By EDWARD V. SOMERS
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THE effect of ferrostatic pressure on metal penetration of the mold sand has been a little-regarded factor in the manufacture of smooth-surfaced castings. The defect of metal penetration, commonly referred to as "burned-in sand," is often attributed to inadequate seacoal and bond additions, or to soft ramming. Seldom is the height of the heads or gates altered as a corrective measure.

Changes in molding practice which are often used in an attempt to eliminate metal penetration are harder ramming, baking the mold, and blacking and baking the mold surface. Frequently, the pouring temperature of the iron is lowered in an effort to reduce the amount of penetration. The relative effectiveness of these various changes in practice is dependent on the ferrostatic pressure that exists when the mold is poured. For instance, a harder ram will eliminate the defect at a lower ferrostatic pressure; but when the ferrostatic pressure is high, a harder ram is ineffective. Blacking will prevent penetration at any ferrostatic pressure, if the rammed surface is hard enough to support the molten metal without distortion and subsequent breaking of the blackened surface. At a low ferrostatic pressure, a change in the pouring temperature will alter the amount of penetration if the section size is small.

Ferrostatic pressure varies directly as to the column height with a gradient of ¼-psi per inch of height. The pressure in green sand molding varies from 2 to 8 psi; in dry sand molding, pressures of 30 to 40 psi are not uncommon. In order to prevent metal penetration the limitations that are placed on the various corrective measures by ferrostatic pressure should be known, and then the proper method for elimination of the defect can be selected.

The effects of variation of ferrostatic pressure, section size, mold hardness (ramming), baking and blacking practice, and pouring temperature on metal penetration were investigated with a test pattern that was designed so as to allow an easy method of testing all of the variations with a small number of molds. The pattern consisted of five cylinders, each of which was 5 in. in diameter. The height of each cylinder was different—½-in., ¾-in., 1 in., 2 in., and 3 in. The effect of section size was tested with each mold made. The castings were made in the drag with a flat cope; this allowed a simplified way of measuring the ferrostatic pressure in a relative manner by using the height of the cope. The additional pressure due to the casting

Fig. 3 (right)—Effect of mold hardness on metal penetration. All test cylinders 5-in. dia, 2-in. height. D—Cope height 5 in.; mold hardness, left to right, 83-89,65-72, 61-72, 10-45. E — *Cope height* 13 *in.; mold hardness, left to right,* 85-89, 78-80, 67-88, 55-65. F—*Cope height* 20 *in.; mold hardness, left to right,* 83-90, 72-86, 65-77, 50-75. *Cylinders show metal penetration increases at lower mold hardness.*

Fig. 4—Effect of baking and blacking on metal penetration. All test cylinders 5-in. dia, height 2 or 3 in. G — Cope height 13 in. Two castings at left, green sand mold; two at right, baked sand mold. H—Cope height 20 in. Castings, left to right, made in green sand, green sand coated and baked with alcohol type blacking, and green sand coated with water solution blacking and baked I—Cope height 40 in. Mold type sequence same as in H. Tests indicate baking alone does not prevent metal penetration, but blacking — either water or alcohol type— prevents peneration

thickness was disregarded, and only the cope height figure is referred to in this article.

Since mold hardness is an important determinant of the amount of metal penetration in a green sand mold, mold hardness readings were taken for each casting with a Dietert mold hardness tester. All readings were taken on the flat bottom surface of each casting impression in the mold; hardness readings were not taken on the vertical surface of the mold where the penetration occurred because the curvature of the surface prevented proper use of the hardness testing instrument. The vertical surface of the mold was softer than the flat horizontal surface, but it was assumed and later corroboated that the differential hardness between the flat surface and the vertical side surface of the mold was not too variable to obscure the conclusions of the test.

By increasing the ferrostatic pressure in green sand molding, the amount of metal penetration is increased. This effect is so severe that nearly all castings made in synthetic green sand with ferrostatic heads of 20 or more inches are subject to the metal penetration defect. A common example of this defect can be seen in the standard ASTM 1.2-in. diameter x 21-in. long test bar that is cast in most foundries in a vertical position. Frequently, the surface of the upper part of the bar is clean, while the surface of the lower part is rough from metal penetration in the sand.

An example of elimination of metal penetration is shown in Fig. 1, a picture of two motor brackets. One of these brackets was cast with a 15-in. head; the second was cast with an 11-in. head by eliminating an oil sand runner box that was placed on the cope. A 4-in. reduction in head resulted in a smooth surface on the second casting.

Effect of increased ferrostatic pressure at various section sizes is shown in Fig. 2. Mold hardness was taken at several points on the bottom mold surface of each casting, and the range of hardness readings for the 15 castings was between 75 and 90 on a Dietert hardness tester. The increase of metal penetration with increased ferrostatic head was noticeable. However, the size of the section displayed no difference in the amount of penetration.

If mold hardness is varied at different ferrostatic heads, the amount of penetration is altered considerably. Soft ramming a mold with a low head (6-in. or less) will not result in any change in the casting surface, but soft ramming a mold with a higher head will change the casting surface considerably. The effect of ramming is illustrated in Fig. 3, where 2-in. cylinders that were rammed to different hardnesses are shown at three different ferrostatic heads. Penetration occurred with the 5-in. head only with a mold hardness of 10 to 45. Extreme penetration occurred at a mold hardness of 55 to 65 with a 13-in. head. With a 20-in. head all four castings had a rough surface;

the casting with the hardest ramming (83 to 90) did not have the extreme penetration that the other three had. In green sand molding metal penetration can be eliminated by harder ramming only if the ferrostatic head is low.

In the past few years a method of blacking and skin drying a green sand mold has been incorporated into most conveyor set-ups that manufacture medium-sized castings. Two blacking methods are now in use. One method employs a mixture of alcohol and blacking; after the mold is sprayed, the alcohol is ignited and the mold is skin dried in a few minutes. The second method employs a mixture of water and blacking; the mold is skin dried for a few minutes with a torch. Both of these methods produced castings with no metal penetration.

Skin Drying Resists Penetration

Three castings made with a 20-in. ferrostatic head are shown in Fig. 4-H. One casting was made in green sand; a second, in a green sand mold that was sprayed with the alcohol type blacking and then skin dried; a third, in a green sand mold that was sprayed with the water type blacking and then skin dried with a torch. Both skin-dried molds produced good castings with no penetration; but the green sand, which was rammed very hard, produced a casting with a poor surface. This procedure was repeated with a ferrostatic head of 40 in. (Fig. 4-I); again, both skin-dried molds produced good castings, while with this high head the casting made in the green sand mold had metal penetration about ¼-in. into the sand.

A series of castings were made in baked molds that were not coated with blacking. The ferrostatic head was low, 13 in., but there was noticeable penetration, as shown in Fig. 4-G. Baking exerts no beneficial effect on metal penetration, but the combination of blacking and baking eliminates the defect. This is due probably to the mechanical filling of the pores between the sand grains with blacking, and the baking simply establishes a firmer coating of blacking on the mold and evaporates the liquid used for carrying the blacking.

Frequently, iron is poured into the molds at a low temperature as a preventive measure against penetration. The effect of low pouring temperature, disregarding the variation of ferrostatic head, is dependent on section size. Castings of large section size will show no difference in the amount of penetration at either high or low pouring temperatures. However, the amount of penetration on castings of a section size of ½-in. or less is greatly affected by low pouring temperature. In the test on the cylinder castings with low ferrostatic heads, (shown in Fig. 5), a ½-in. section will have a smooth surface if it is poured at 2420 F or lower. The limitation of cold shuts at low pouring temperature will determine how successfully this method can be applied.

Conclusion: A simplified explanation of metal penetration appears to be that of iron seeping through the porous structure of the molding sand. Any mechanical method of reducing the porosity of the mold surface will reduce penetration. In this manner, ramming the sand harder will pack the grains of sand more closely and will reduce the penetration. Blacking will cover the porous surface completely and eliminate void spaces for penetration of the iron.

An increase in pressure of the iron at the mold surface will force the metal further into the porous sand structure. A probable explanation of the effect of lower pouring temperatures is a change in either the surface tension or the fluidity of the iron at lower temperature. Increased surface tension or decreased fluidity offers greater resistance to penetration, and in a casting with thin sections the fast cooling of the iron during pouring decreases the amount of penetration.

The problems of metal penetration in green sand molding can be corrected by several (*Please turn to Page* 171)

Fig. 5—Effect of pouring temperature on metal penetration. All test cylinders 5-in. dia. mold hardness 80-95. J—Cope height 20 in.; cylinder height 1/2-in.; pouring temperatures, left to right, 2370, 2420, 2480, 2560, 2620, 2650 F. K—Cope height 20 in.; cylinder height 1 in.; pouring temperatures same as in J. L—Cope height 20 in.; cylinder height 3 in.; pouring temperatures same as in J. Metal penentration was reduced only on 1/2-in. sections poured below 2480 F

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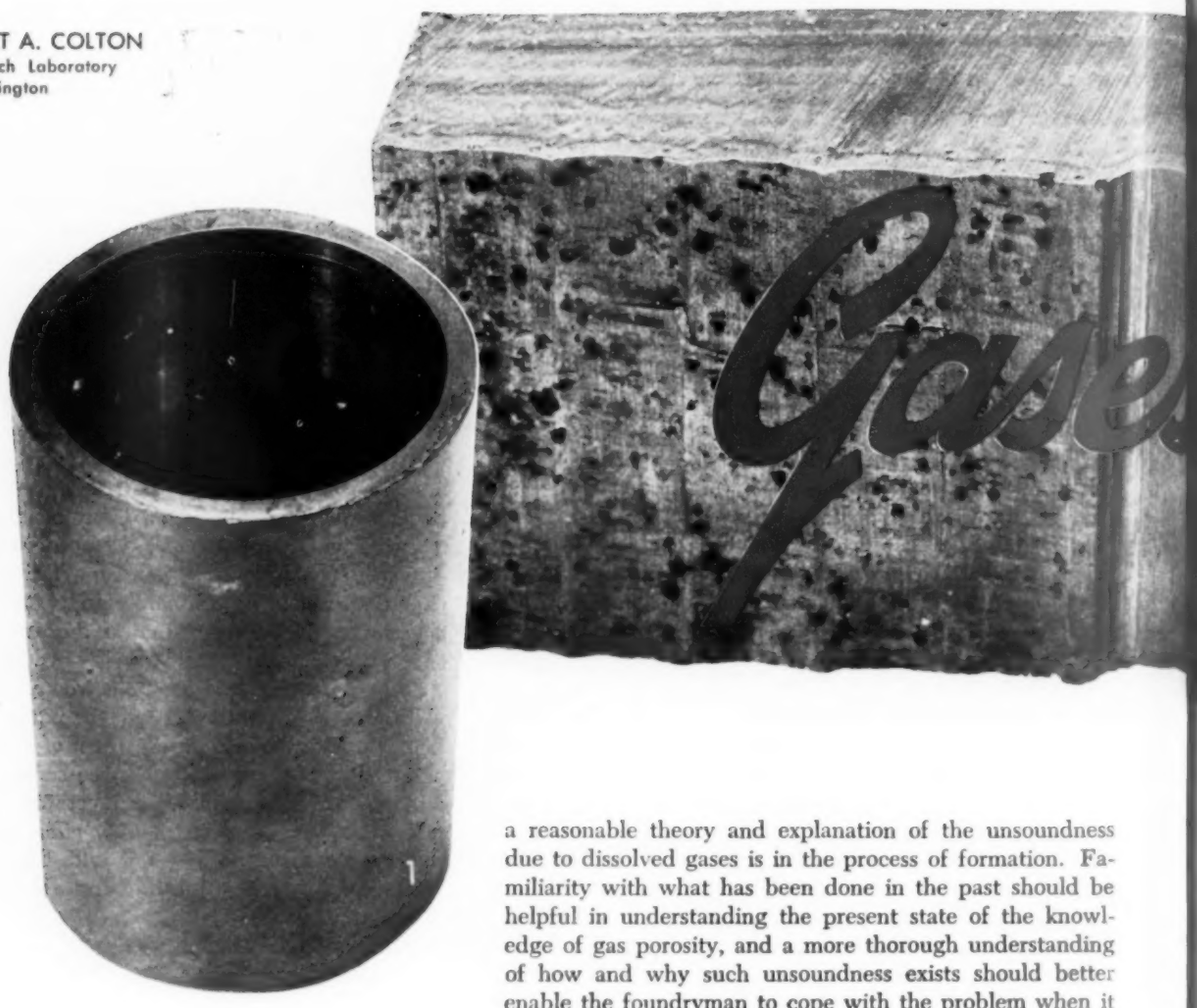


AMONG the numerous reasons why bronze castings may be unsound and unacceptable, the porosity caused by evolution of dissolved gases and by solidification shrinkage is probably the most important. The latter type of unsoundness, caused by the long freezing range of most bronze alloys, is fairly well understood. This interdendritic type of porosity is common to most copper-tin or copper-tin-zinc alloys and is the source of much of the leakage under pressure encountered in bronzes. To a certain extent, this unsoundness can be minimized by adequate feeding of castings, but as long as the composition of bronzes remains unchanged, interdendritic shrinkage and the resultant porosity can never be completely removed.

The porosity caused by the evolution of dissolved gases is just as prevalent as the shrinkage type, but is understood less thoroughly. The extent of the literature on this subject for the past 35 years is indicative of the attention given the subject by foundrymen everywhere. Through the efforts and studies of a great number of metallurgists a reasonable theory and explanation of the unsoundness due to dissolved gases is in the process of formation. Familiarity with what has been done in the past should be helpful in understanding the present state of the knowledge of gas porosity, and a more thorough understanding of how and why such unsoundness exists should better enable the foundryman to cope with the problem when it arises. As a prelude to the work on porosity itself it is worthwhile to consider some of the theoretical background of the subject; the work on the solubilities of gases in metals is of fundamental importance to an understanding of gas porosity.

Gas Solubility in Metals—The classical work in this field—and the first fundamental contribution to the study of gas porosity—was that of Sieverts[1] and colleagues around 1910. They studied the solubility of several gases in a number of liquid metals and alloys, including the bronzes, and proposed the relationship that the amount of gas held in solution by a given metal at a given temperature was proportional to the square root of the partial pressure of the gas. In addition to their data on hydrogen solubility in copper they reported that tin contents up to 10 per cent slightly reduced the solubility of hydrogen in copper. Iwase[2], in 1926, reported large hydrogen solubility in several compositions of copper-tin alloys, but his results appear to have been in error. Most of the work on solubility of gases in metal has been on hydrogen, since that gas has an appreciable solubility in most metals. Sulfur dioxide also is somewhat soluble but to a lesser degree than hydrogen.

In 1929 Sieverts[3] published a review of his earlier work,

Fig. 1—Bronze bushing showing effects of gases in the metal. Inside and outside surfaces were machined from the bushing, revealing high degree of porosity

Fig. 2—Section from bronze plate showing typical subsurface gas porosity. This especially severe case is probably the result of gases produced by the molten metal reacting with either excessive moisture in the sand or moisture present from a mold wash

en Bronze

and in 1924 Roentgen and Moeller[4] reported their investigation on the solubility of hydrogen in copper. Their results agreed fairly well with those of Sieverts, but differed considerably from the data offered by Iwase. A critical review of all the previous work on gas solubilities in metals was published by Kubaschewski[5] in 1938 and included an extensive bibliography.

Recently the experimental techniques of Sieverts have been checked, first by Floe and Chipman[6, 7] studying SO_2 in copper, and by Bever and Floe in 1944[8] investigating the solubility of hydrogen in molten copper-tin alloys. This last work appears to have been carefully carried out and can be considered the best on the subject. Bever and Floe found that the solubility of hydrogen in copper between 1100 C and 1300 C is nearly proportional to the temperature. At these same temperatures they found that the solubility of hydrogen in tin is low; the solubility of hydrogen in molten copper-tin is then a function of the tin content, decreasing rapidly to 40 per cent Sn, and then decreasing slowly. Both parts of the curves are nearly straight lines. Sieverts' Law was substantiated by both these investigations.

Little of the published work has dealt with the solubility of hydrogen (or any other gas) in solid copper or copper alloys, although some work of this nature has been attempted with iron and steel. Pearson and Baker[9] did not measure any such quantity directly but estimated that in a 90-10 copper-tin alloy the change of hydrogen solubility at the solidus was approximately 0.3 cc/100 g, while in pure copper the change in solubility at the solidus has been measured to be 3.3 cc/100 g. The importance of knowing such solubilities, particularly hydrogen, should not be underestimated. The fundamental theory of gas porosity requires data that do not exist at present. Techniques for securing such information have been developed for ferrous materials, so that it should be only a matter of time before such data are available for copper-base alloys.

Gas or Gases Responsible for Porosity—Since scientific interest has first been displayed in the subject of gas porosity in bronzes, most of the common gases have been thought responsible for the unsoundness, and it is only comparatively recently that some measure of agreement and clarification can be found in the literature.

Oxygen was thought responsible for porosity by most of the early workers, but Comstock[10] believed that the so-called oxides at the grain boundaries were really fissures created by contraction on freezing; his contention was proved to be valid, and it is believed today that oxygen alone is unlikely to cause porosity.

There appears to be no doubt that nitrogen is insoluble in bronze. Allen and Puddephat[11] obtained maximum densities from tin-bronzes furnace-cooled in the gas, in shallow, open boats. Bailey[12] noted a decrease in the percentage of voids in 95:5 tin-bronze castings resulted from treatment of the melt with nitrogen. The inertness of nitrogen to bronze has been used by Bailey[13], Daniels[14], Pearson and Baker[9], Lepp[15], Claus and Bauer[16] to provide a standard for comparison in judging the effects of other gases in bronzes. The use of nitrogen to flush other gases out of bronze has been suggested as a commercial practice following the work of Archbutt[10] in aluminum.

Daniels[14] and Hesse[17] state that carbon dioxide is insoluble in bronze; Pearson and Baker[9], and Daniels[14] indicated that there is some slightly solubility of carbon monoxide in copper alloys. Hesse[17] (*Please turn to page* 134)

Fig. 3—Radiographs of 5 per cent nickel-bronze plates showing severe gas porosity well distributed throughout the plates

Increases Malleable

By PAT DWYER
Engineering Editor
THE FOUNDRY

CONFRONTED in 1944 with the problem of producing yearly 44,000 tons of malleable iron castings, or approximately twice the ordinary capacity of the plant, the management of the Albion Malleable Iron Co., Albion, Mich. had the choice of two alternatives. One was to build and equip an entirely new plant. The other was to revamp and reequip the existing plant, introduce new methods of operation, and increase the working force to a number sufficient to operate the plant day and night. The second alternative was adopted.

Following a complete survey and study of the situation the entire project was placed in the hands of an engineering and consulting firm, which carried it through to completion. One of the most remarkable features of the job was that despite the amount of excavation and construction involved, the foundry remained in constant operation without the loss of a single molding day. Another factor which proved quite troublesome was the fact that the floor slopes down hill from north to south a distance of some 5 ft. The main crane runway, with three existing 5-ton electric traveling cranes, of course was level, while the monitored bays extending east and west from this central bay stepped down from bay to bay to give a uniform headroom from north to south.

The general layout of the plant, covering an area of approximately 450 x 850 ft, is shown in Fig. 4. The property is bounded on the east by Albion street and on the west by a siding from the Michigan Central division of the New York Central Railroad. The plant is designed to facilitate constant, progressive and logical movement of material in process from the north and west sides, where raw materials enter the plant, to the south-east section, where finished castings are shipped. Molding and core sand, binders, oils and other sand additives are stored in the extreme north end of the plant, conveniently served by a spur from the plant track system. Steel scrap, sprue and pig iron are stored on the west side of the property, adjacent to the cupola charging mechanism to be described later. All of this material is unloaded, stocked and moved as necessary by magnet from locomotive cranes, one of which always is held in reserve.

To maintain a 44,000-ton production introduced inventory and stocking problems which were worked out with a minimum of labor and transfer expense. On a 50 per cent yield in malleable foundry practice the production of 44,000 tons per year means 3600 tons per month, or nearly 150 tons daily for a 25-day month. As the floor space was established, incoming material and location of charge were fixed. Many ingenious and unique transfers and mechanisms were necessary to accomplish a smooth flow through the plant. Cupola charging, sprung, annealing and finishing room arrangements deserve particular mention.

Commencing at the lower right corner of Fig. 4, and—contrary to established occidental practice—reading up and from right to left, the first building, an attractive buff brick structure, houses the general administrative and executive offices, with all offices served by a wide center hallway. A finished basement contains additional offices, meeting room, file storage, and forced circulation warm air heating plant. A short covered ramp leads from the office to the plant proper.

First in this section directly south are several factory offices, process control and plant engineering offices. Then there is a metal pattern department, completely equipped with tools and its own small pattern foundry, molding and melting equipment. Directly south the pattern storage is conveniently located for pattern change and repair. Remainder of this bay is devoted to women's locker and shower rooms, personnel, first aid and time departments. The bay ends in a general plant employee entrance.

Core sand and material storage, coremaking department, flask storage, plant maintenance department, and battery and truck service station are shown between the molding department and directly west of the departments listed in the foregoing paragraph. Core sand prepared in both muller and paddle mixer is delivered to the various core blowers and benches by an overhead electrified monorail system, in a department 165 x 250 ft.

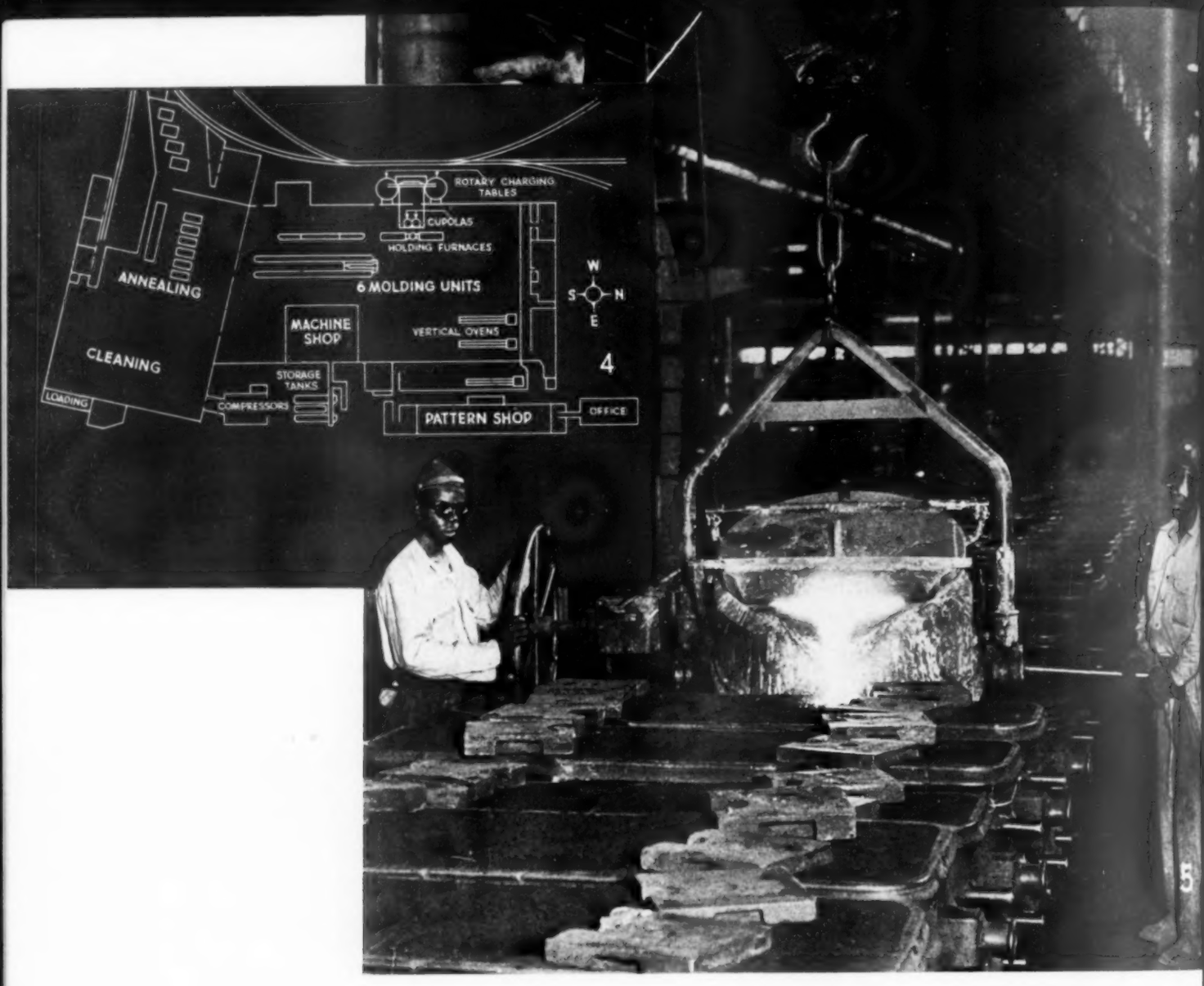
Bulk of the cores are dried in a battery of three large vertical ovens. The jobbing work redry after pasting as well as exceptional cores are handled in a three-cell conventional type batch oven. Dryers are stored in the department, rod and wire are stored, cut and straightened here, and chill preparation and baking is incorporated in the core department. Cores from the vertical ovens operating on a maximum temperature of 450 F are cooled and classified in racks from long lines of roller conveyors leading south

Fig. 1 — Revolving platform, 40 ft in diameter, receiving sprue and scrap from the foundry on conveyor belt. Material builds up into circular mound as the platform revolves

Iron Capacity

Fig. 2—Magnet dropping sprue and scrap through hole in deck of raw material platform into cupola weighing bucket automatically spotted beneath. Pig iron is handled similarly at another platform

Fig. 3—Metal from holding furnaces is tapped almost continuously into 3000-lb insulated bull ladles and distributed by overhead electrified monorail system



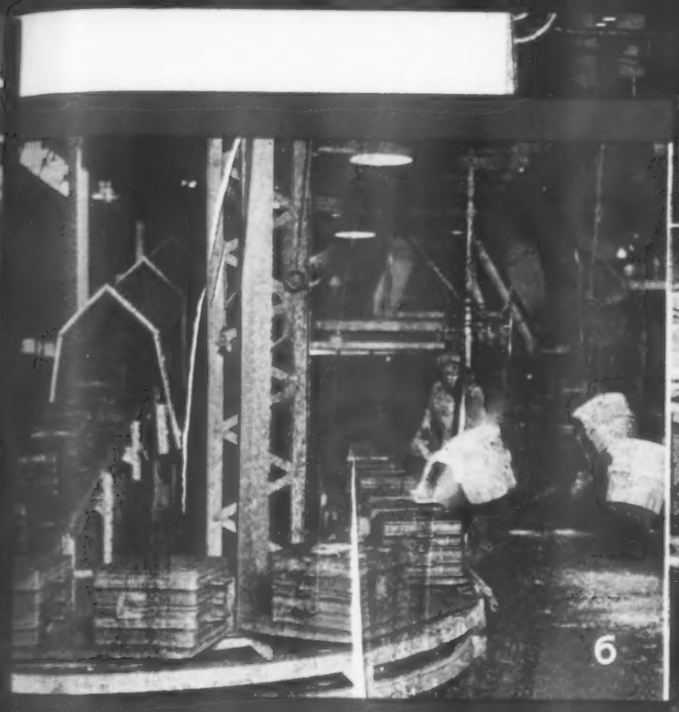
from the ovens to finishing, pasting, assembly and storage.

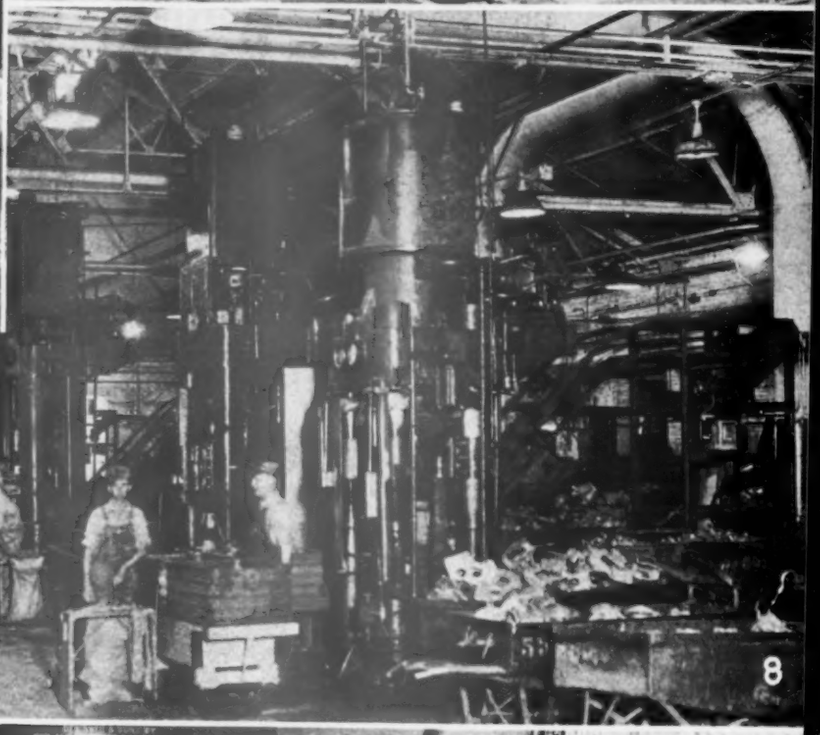
As soon as production requirements will permit the general foundry maintenance department will be located in a space 100 x 134 ft. This department includes the central warm air foundry heating plant, fuel oil system, electric truck charging units and the other services to the plant. The warm air circulating plant is arranged for either fuel oil, natural gas or standby liquid gas. A complete standby liquid gas system for the entire plant, including annealing, also comes under the supervision of this department. The bulk unloading and distributing system is located immediately adjacent and to the east of the plant maintenance arrangement. Further storage and a men's locker and shower room to the south east of the maintenance division complete the floor space in this central area.

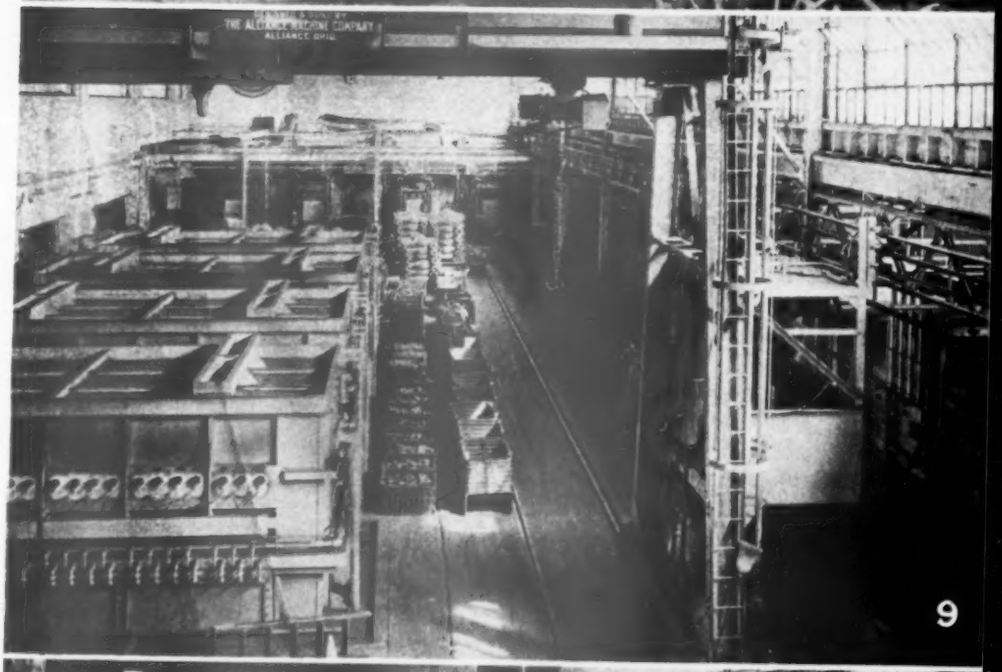
All molding, machine and floor, is done in six units in the western half of the foundry proper in an area approximately 120 x 450 ft. Unit No. 1 is a roller set-out floor taking care of approximately 17 per cent of the tonnage and largely devoted to jobbing work. Unit No. 2 is a pallet conveyor snap flask line with an automatic weight handling mechanism. Unit No. 3 is another pallet conveyor line on production work adapted to steel coke and drag production. An air cylinder push off and overhead conveyor return flasks to the molding stations. Units Nos. 2 and 3 account for a little more than 35 per cent of the production in tonnage. Unit No. 4 also is a pallet conveyor system for heavy production. Four rollover jolt machines and four jolt strippers perform the molding functions on this line. All work here is handled on small jibs with air hoists.

Pouring on this line is aided by a synchronizer carrying the ladles at the same speeds as the mold conveyor. To conserve floor space one half this line—the cooling half—is under the floor in a fan ventilated tunnel. On the two preceding lines floor space is conserved by elevations of the cooling portion of the lines. These portions also are hooded and fan ventilated. The No. 5 unit is under the main crane bay and is devoted to approximately 10 per cent of the tonnage, namely, heavy jobbing. Main production tools are large rollover jolt stripper and a team of cope and drag jolt stripping machines. Space is available for incidental floor molding.

No. 6 floor is used on production at present, but was planned as merely a sample and incidental molding floor. All systems save No. 6 are served by individual shakeouts, automatic and controlled sand conditioning and delivery. Units 2, 3, and 4 have spill sand hopper and belt return. Facing for the entire plant is made at odd times on the sand system serving units 4 and 5. (*Please turn to page* 94)







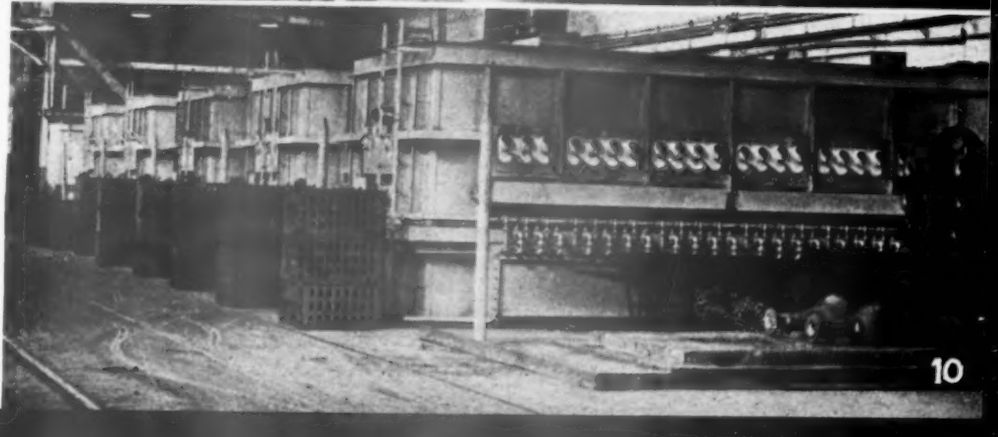


Fig. 4 — General layout of Albion Malleable Iron Co. plant

Fig. 5—Truck axle housings are poured from high-temperature metal conveyed directly from the furnace in a 3000-lb ladle

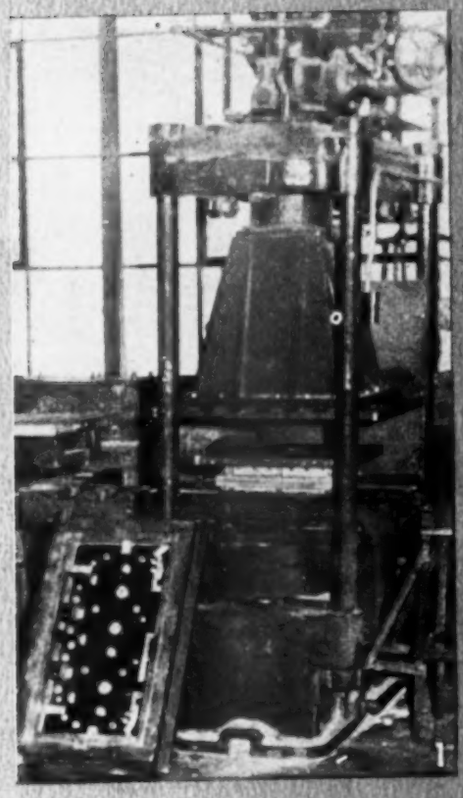
Fig. 6—Small molds on a conveyor pass through a cooling and smoke removal tunnel

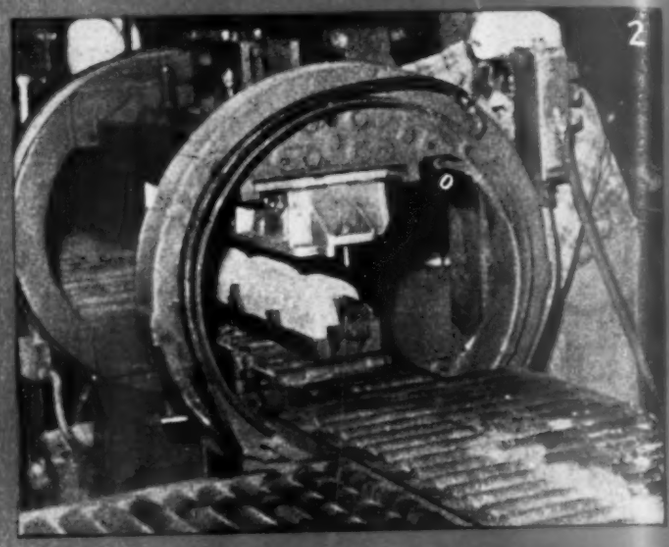
Fig. 7—Short conveyor lines bring the castings in boxes to the grinding wheels

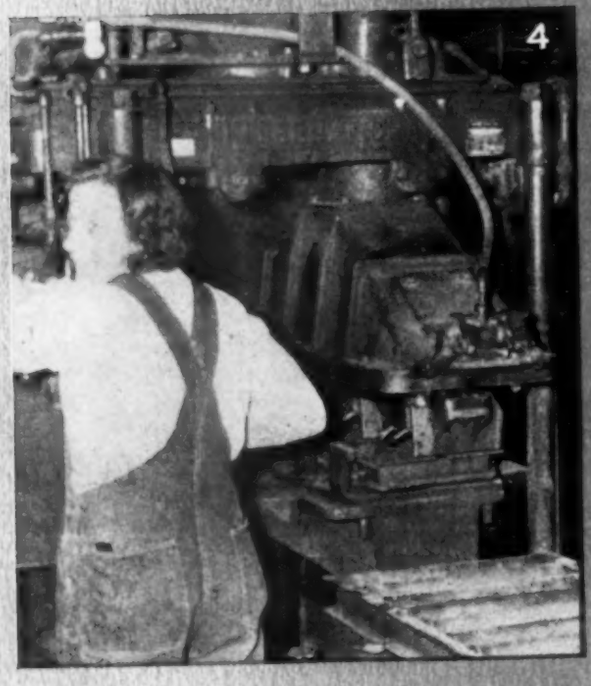
Fig. 8—A battery of hydraulic presses corrects slight variation in shape

Fig. 9—Main bay of annealing room, showing furnaces and special type crane

Fig. 10—Castings are piled on foundation and furnace body is lifted on and off







By LAWRENCE D. PRIDMORE
Treasurer
International Molding Machine Co.
Chicago

Core Blowing Practice

Fig. 1—A set of rollers facilitate entrance and later removal of the corebox from under the magazine of the machine

Fig. 2—Large cores are rolled over in a specially balanced device erected over the conveyor between the blowing machine and the oven

Fig. 3— Small cores of uneven contour are supported in dryer shells conforming approximately to the shape of the corebox

Fig. 4—Sand magazines of various sizes and shapes have been designed for use with a wide variety of coreboxes

Fig. 5—Small rails on either side of the table rollers guide the corebox to proper position under the magazine and blow plate

ATTEMPTS to blow sand into coreboxes were initiated in the United States by the Demmler Mfg. Co., Kewanee, Ill., where the first machine was built in 1911. In 1914 the Woodison Co. developed a machine on a slightly different principle. In 1930 the Osborn Mfg. Co., Cleveland, the Champion Foundry & Machine Co., Chicago, and the International Molding Machine Co., Chicago, began experimental work. A wide diversity of opinion prevailed on the subject, but all agreed that high air pressure—from 125 to 130 psi—was necessary. The blowholes used were small and the venting problem was scarcely touched.

An experiment first was tried with small pin cores, open at both ends. The air could escape readily. Later, other small cores for plumbers' castings, ells, tees and other shapes were blown satisfactorily. An ingenious individual—his name, unfortunately, lost to fame—decided to put an old metal corebox on the machine; he had nothing to lose, since the box was about to be discarded. The cores proved satisfactory in every respect. The reason, of course, was that the edges of the box were worn, the joints were loose and the air escaped. This suggested the idea to several others to cut slots or file vents, in the sides of the boxes. However, on many cores, certain small areas either were empty or soft. Since air has to go out before the sand can go in, a small hole was drilled in the affected area, and another step in the problem was solved. While satisfied that the method was practical for nearly all types of cores, belief was general in the early days that a core of 5 lb represented the limit on this method of production.

Through a gradual series of evolution, core blowing machine makers have settled upon three standard types of vents, the slotted type, the screen type and the hole type. Each of these has a distinct purpose. The slotted vent and the hole vent are placed in the corebox at or near the area where the casting comes into contact with the core face. The screen vent usually is placed on a core print where it leaves a little mark that might be undesirable on the face of the casting.

Ordinary Air Pressure Satisfactory

Proper venting technique probably is the most important factor in core blowing practice. A proper sand mixture also is important, but that is a factor which the machine maker leaves to the foundryman. Air pressures from 50 to 130 psi have been tried, but later it was discovered that the ordinary line pressure in any foundry—from 70 to 90 psi—can be employed to blow cores, provided the sand characteristics are suitable.

The small blowhole no longer is used, that is, a blowhole ¼ or 5/16-in. diameter. The usual size is ⅝ to ¾-in., with exceptions up to 2-in. diameter. With the large blowhole, sand with a moisture content of 7 per cent, and in some instances 8 per cent, can be blown. The moisture content must be watched closely where the blowhole is small. On large cores which must be prevented from sagging in the green state, the green strength is improved by increasing the amount of binder. Wet and dry binders of all descriptions have been tried at one time or another. Probably the most difficult is fly ash; no one likes to use it, but it works. The machine will blow practically any core sand mixture, but the most satisfactory mixture depends on the shape and size of the core.

A certain steel foundry is blowing 250-lb cores through twenty-seven 1¼-in. diameter blowholes. The sand is almost hard enough to walk on, but it can be moved. A feature that occasionally escapes attention is the tendency of the sand to pipe in the magazine or container. Sand enters the top of the magazine (*Please turn to page* 168)

AFA Congress Program *Nears Completion*

A WIDE variety of foundry subjects will be covered in the various technical meetings to be held during the 50th Anniversary Convention of the American Foundrymen's Association in Cleveland, May 6-10. Details of the program now are being completed, and the tentative schedule of sessions—shown at the conclusion of this article—includes nearly 50 separate meetings.

As has been the practice in recent past conventions, sessions relating to individual divisions are scheduled within a few successive days rather than spread over the entire five days of the congress. For instance, gray iron sessions are scheduled for Wednesday through Friday, aluminum and magnesium for Monday and Tuesday, malleable for Tuesday and Wednesday, steel for Thursday and Friday and brass and bronze for Wednesday through Friday. Meetings devoted to subjects of general interest are scheduled throughout the week.

The lecture course session to be held this year will be given in five parts, one on each day of the meeting. Subject of the lecture has not yet been announced but it will be of interest to the majority of foundrymen. Another group of sessions expected to prove popular is the sand shop course to be presented Monday through Thursday. Other special events include a luncheon for engineering school alumni groups, a chapter officers and directors dinner, a foundry instructor dinner and sessions on training problems.

Annual dinner of the association will be held Friday evening, and the alumni dinner for past officers and directors is scheduled for Thursday evening. Annual business meeting of the association will be held Thursday morning.

Two of the Gray Iron Division's five sessions will be devoted to a symposium on engineering properties. A third session will be on "Welding of Gray Iron," while papers at the other meetings will deal with slag control, cupola melting, theory of inoculation, and the effect of heat treatment on the endurance limit of cast iron.

The Malleable Division plans another symposium this year, the subject to be coremaking. Papers scheduled for other sessions of this group will cover processing of malleable iron, practical aspects of air furnace melting, and the effect of boron on malleable iron. The Brass and Bronze Division again will hold its annual round-table conference, with subjects at other sessions to include new methods for producing straight copper castings and new techniques facilitating removal of gates and risers.

The Steel Division is scheduling seven or more papers covering such subjects as low temperature properties of certain cast steels, thermal relief of residual stresses, methods of quality control, methods for control of hardenability, and various types of blind risers. Sessions to be devoted to aluminum and magnesium subjects range from the practical to the metal- (*Please turn to page* 166)

Officers and Directors Nominated

Sheldon V. Wood, president and general manager, Minneapolis Electric Steel Castings Co., Minneapolis, was nominated as president of the American Foundrymen's Association at a recent meeting of the nominating committee. Mr. Wood now is serving as vice president. At the same meeting, Max Kuniansky, vice president and general manager, Lynchburg Foundry Co., Lynchburg, Va., was nominated as vice president. New officers and directors will be elected May 9 during the national convention in Cleveland and will take office immediately following the board of directors' annual meeting in July.

The following have been nominated as new directors of the association: Horace A. Deane, vice president in charge of operations, Brake Shoe & Castings Division, American Brake Shoe Co., New York; Stowell C. Wasson, manager, National Malleable & Steel Castings Co., Chicago; Bruce L. Simpson, president, National Engineering Co., Chicago; J. E. Kolb, pattern shop superintendent, Caterpillar Tractor Co., Peoria, Ill., and H. G. Lamker, superintendent of foundries, Wright Aeronautical Corp., Paterson, N. J.

Members of the nominating committee which selected the 1946 slate include: Lee C. Wilson, Reading, Pa.; Ralph J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich.; J. A. Woody, American Cast Iron Pipe Co., Birmingham; I. M. Emery, Massillon Steel Casting Co., Massillon, O.; Howard F. Taylor, Naval Research Laboratory, Washington; Dr. N. E. Woldman, Eclipse Pioneer Division, Bendix Aviation Corp., Teterboro, N. J.; Frank W. Shipley, Caterpillar Tractor Co., Peoria, Ill.; E. E. Ballard, National Bearing Metals, St. Louis, and A. M. Fulton, Northern Malleable Iron Co., St. Paul.

Making CORED ALUMINUM CASTINGS

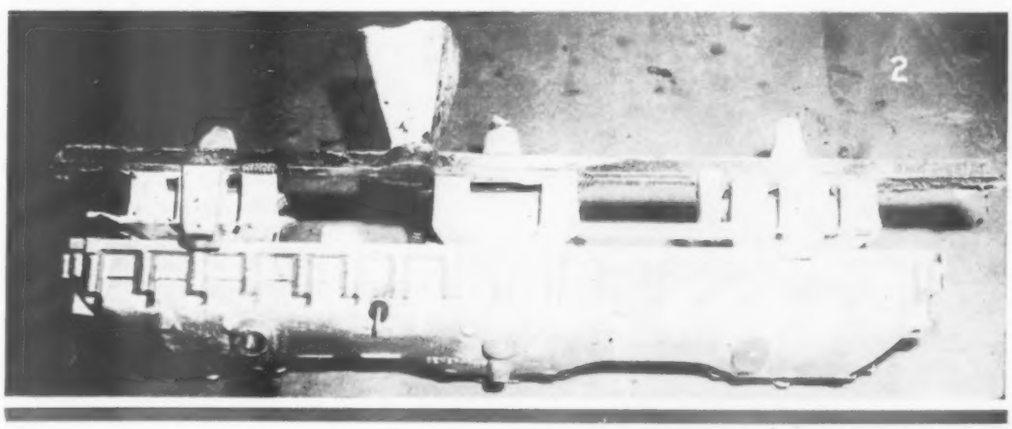
Fig. 1—Since the core must be set accurately, it is fastened to a guide or template which is located for position by the flask pins. After the guide "bottoms" it is released from the core

LONG experience in the production of quality aluminum castings stood the Werra Aluminum Division, General Malleable Corp., Waukesha, Wis., in good stead when it was called upon to make castings for various agencies of the armed forces during the war. However, with the rising tempo in battlefront activities the demand for castings and other materials soared, and men were drained from industry to augment the military personnel.

Beset on one hand by the manpower shortage and on the other by pressure for increasing production, the firm, like many other foundries, ventured into a field with which it was little acquainted—the employment of women. They were recruited from housewives and other women without any previous industrial experience, and trained by simply placing them as observers in the production line with skilled workers. After a short period they became conversant with the various operations, and were given the simpler tasks to perform. Gradually the trainees undertook the more difficult operations, and before long could hold their own with the skilled workers.

At the peak of war production from 50 to 60 per cent of the foundry employees were women who conducted successfully the numerous operations, except those of molding and melting. For example, women carried on practically all finishing operations on castings as well as the inspection. Likewise in the coreroom the majority of employees were women. They made cores on the bench, machine and on blowers; finished the cores, inspected, assembled, and again inspected them. Core sand was mixed by women, and they also checked the melting and pouring tempera-

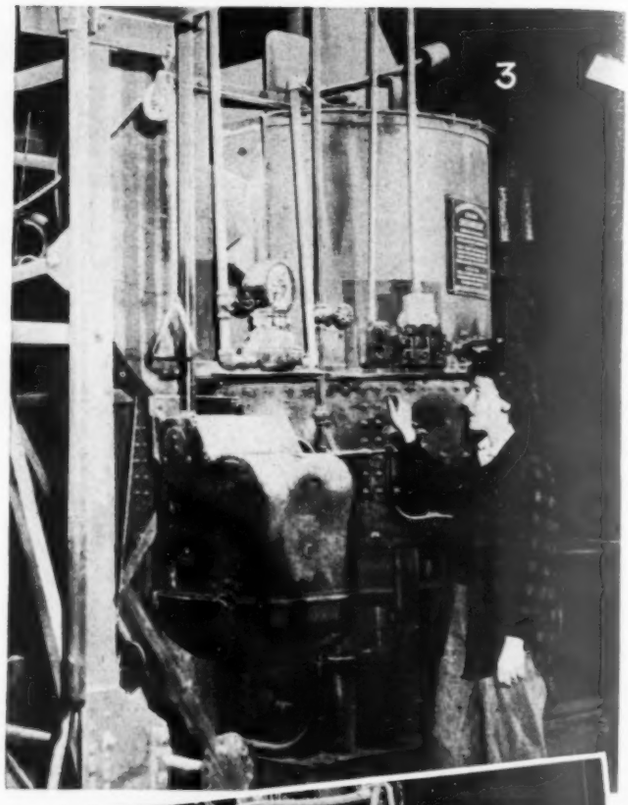
Fig. 2—View of the aluminum alloy side manifold casting, with the gating system still attached, shows the numerous gates and risers used to insure non-turbulent flow and good feeding



tures of the various types of the aluminum alloys.

To aid in increasing production the firm installed labor-saving equipment such as rollover and draw devices and conveyors in the coreroom, hoists, etc. A complete new lighting system was installed to provide adequate illumination at all times. In some departments lighting is by fluorescent lamps, while in others it is by combination of mercury and incandescent lighting. A program of good housekeeping was instituted and rigidly adhered to with the result that all foundry departments are shipshape and clean.

In the production of castings at the Werra Aluminum Division, cores are made from a mixture of lake and bank sands which are stored in covered bins adjoining the coreroom. From the storage bins the sand is elevated to a storage bin of 15 tons capacity above a rotary gas-fired drying kiln. Sand flows by gravity into the drying kiln which has a capacity of 6 tons per hour. From the kiln the sand drops into the boot of a bucket type elevator which carries it up into a 25-ton storage bin above the sand muller. Dry sand from the storage bin is dumped into a measuring bucket attached to the muller and charged into the latter where the core oil and moisture are added. After 1-min. mulling time the sand is discharged onto an elevating belt. The elevator carries the sand to a cross conveyor belt which travels over (*Please turn to Page* 226)



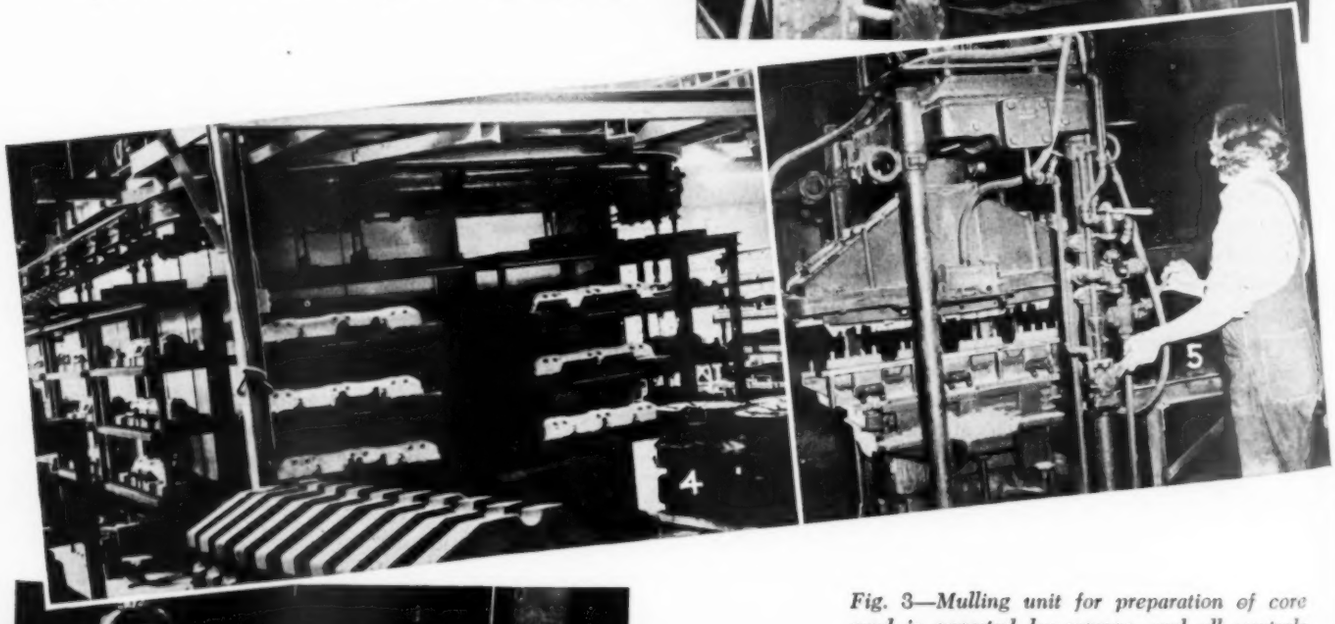


Fig. 3—Mulling unit for preparation of core sand is operated by women, and all controls are located together. Bin at the left contains the dried sand

Fig. 4—After dipping cores are placed on racks and carried through a continuous type oven where they are dried

Fig. 5—Large cover cores and interior or pipe cores for the manifold are blown on machines by women. After blowing corebox is pushed onto the roller conveyor at right

Fig. 6—Cores are withdrawn from coreboxes easily and smoothly without fatigue by means of rollover-drawing devices

Putting Equipment TO WORK

By R. G. McELWEE
Manager, Iron Foundry Division
Vanadium Corp. of America
Detroit

EDITORIAL pages of the technical magazines have placed emphasis during the reconversion period upon the necessity for better control methods and higher standards in the gray iron industry. A great many foundries have accepted business during the war years, either directly or indirectly, from one of the armed services and have found that it has become necessary to exercise a higher degree of control than was previously considered feasible or necessary. To many this has been a pleasant experience. To practically all who have found it necessary to raise standards of quality, there will be the satisfaction of better earning statements because of having moved into a market willing and able to pay for that degree of quality which requires better foundry methods. To warn management, however, of the various steps necessary to accomplish the production of better materials, this resume of experiences and thoughts is offered.

The initial capital investment in a piece of control equipment or laboratory apparatus is not in itself sufficient to justify the statement that standards are raised. It has been the writer's experience that some of the finest work has come from poorly-equipped shops and, conversely, some extremely low-grade work has come from shops with the finest of equipment. To borrow a thought from one of the large producers of medicinal products, there is no substitute for the integrity of the manufacturer.

It is surprising how the enthusiasm of the manager of an institution for quality production can be imparted to the workman, especially when proper tools are provided. However, the purchase of the equipment is but one step; provision should be made for manning the equipment and for co-ordinating the functions of the apparatus to production, to inspection, and certainly to sales effort. It is no longer sufficient to make a good product; it is just as important to be able to demonstrate that a good product is being made and to use the tools available to impress upon the customer that he is getting some extra value for the premium which he is being called upon to pay. The foregoing statements apply equally as well to the foundryman who purchases service instead of equipment.

An incident which happened quite some time ago illustrates the folly of purchasing such service without making use of it. Upon being called for consultation regarding some difficulty with castings, I asked to be permitted to review the records of daily analysis over the previous year. The idea, of course, was to plot the deviations and to determine the adaptability of the iron for the job in question. At the request of the manager the secretary provided a drawer containing approximately 250 cards, each of which had a complete analysis. While going through this record the secretary came over to the desk and asked: "Just what are these cards?" Upon being informed that they were records of foundry analysis she remarked: "I have often wondered. They come in the mail every day and I file them religiously. So far no one has ever looked at them."

To this experience I could add cases in which management has pointed with pride to the possession of very fine microscopic equipment, and upon my expressing a desire to examine a specimen, to have been confronted with the task of removing a year's accumulation of dust before the microscope could be used.

These examples may sound ridiculous; they are even worse, because in the case of the microscope the "touch" necessary for the polishing of samples and the identification of structures cannot possibly be attained by the single annual use of such important testing equipment.

Another case will be cited to illustrate a point. A foundry with a daily production of approximately 50 tons of work which would have a selling price of 10 cents per pound finds itself in a position of having a scrap loss of 6 per cent. No one is responsible for the maintenance of proper cupola operation throughout the day, nor for taking chill tests from each ladle. That would add a man to the payroll. It is not an ambitious statement that such control could reduce the scrap by at least 1 per cent. A 1 per cent scrap reduction would result in an additional revenue of nearly $100 per day, yet the man cannot be procured.

Mention was made of the foundry which secures a daily analysis and smugly files this record of its performance. It would be a very safe bet that the sample from which this daily analysis was taken was prepared at a specific time of the day according to a very strict routine. It certainly can be deducted that the very fine file secured at considerable expense is only a record of what that foundry produces at 8:30 every morning. It would be most illuminating in such cases as this to make the extra effort to take a sample every 15 minutes, or even every 30 minutes, during the day and run the carbons and silicons and plot the results.

The deviations due to shutdown, changes of melting rate and various other causes are almost beyond belief. There can be no better investment in the average foundry than the assignment of a man whose sole responsibility is the maintenance of quality. Many foundries have such a man. When you question him you will find that through the years he has accumulated a dozen or more incidental duties; that is, they were incidental when they were assigned, but time has made them of prime importance, and in his spare moments he watches the cupola (*Please turn to page* 132)

EXHIBIT "H"
STOCK RECORD

KIND OF MATERIAL — *85-5-5-5 INGOT*
SOURCE OF SUPPLY — ACCT. NO. *41A*

A _____ D _____ ORDERING QUAN.
B _____ E _____ MAX. _____
C _____ F _____ MIN. *10,000*

DATE	QUANTITY			TOTAL ON HAND	Source Code	COST PER CWT.	VALUE	Total Inventory Value	USE PER MONTH	
	Ordered	Received	Used						Pounds	Value
10/1	*Inven*	*tory*		*10,000*			*1,300.00*	*1,300.00*		
10/2	*5,000*				*A*					
10/5		*5,000*		*15,000*	*A*	*13.00*	*650.00*	*1,950.00*		
10/15	*10,000*				*B*					
10/20		*10,000*		*25,000*	*B*	*13.00*	*1,300.00*	*3,250.00*		
11/1	*Inven*	*tory*	*8,000*	*17,000*		*13.00*	*1,040.00*	*2,210.00*	*8,000*	*1,040.00*

NONFERROUS

How to determine costs is described in this second of three installments of the "Simplified Accounting Procedure and Cost Methods" prepared by the Non-Ferrous Founders' Society. The first installment appeared in the February issue

IN THE preceding sections we have been concerned with the work and problems covered in general accounting practices. They are vital and essential. The importance of these records should not be minimized. They are necessary before cost accounting can be considered.

Referring again to Exhibit *F*, the Profit and Loss Statement (THE FOUNDRY, February) one must agree that the most significant figure in that statement is the Cost of Sales Billed, of $2625.00. In this simple illustration, since we have assumed that inventories remained unchanged, this figure is easily arrived at by the analysis of the cash account of the General Ledger and the additions of amounts in the accrual reserves that affect operations.

Taking the 7000 lb of brass and the 2350 lb of aluminum shipped, making a total

EXHIBIT "I"
PAYROLL AND LABOR DISTRIBUTION SHEET

NAME JOHN DOE

ADDRESS 401 STATE ST. CLOCK NO. 216 NO. DEPEND.

DATE OF BIRTH 6-12-98 OCCUPATION COREMAKER PHONE 972J

SOCIAL SEC. NO. 378-02-1968 DATE EMP. 4-1-42 DATE TERM

JOB CLASS MERIT RATE Rate Per Hr. 1.00

JOB CLASS MERIT RATE Rate Per Hr.

DATE	TIME WORKED BY COST CENTER													TOTAL
	91	92	93	94	95	96	97	98						
11/1	6.2				2.3									8.5
11/2	6.0			2.0	1.0									9.0
11/3	5.5			1.0	2.5									9.0
11/4	6.0				2.0									8.0
11/5			S	U	N	D	A	Y						42.5
11/6	7.5			2.5										10.0

COST ACCOUNTING

Total	120.1						
Ext.	120.10						

PAY PERIOD ENDING	11-4		11-11			
Reg. Hrs.	42.5	42.50				
O. T. Hrs.	2.5	1.25				
Total Earnings		43.75				
F. O. A. B.	.44					
W. H. Tax	4.00					
Ins.	.60					
Bonds—Miscl.	2.75	7.79				
Total Net Paid		35.96				

of 9350 lb and dividing this poundage into the $2625.00, produces an overall cost of $28.07 per cwt of castings manufactured. This can be called a cost, but it is certainly not recommended for use.

As it is the purpose of this manual to function as an instruction primer, and to point out the need for adopting, by individuals and by the industry as a whole, certain basic fundamentals of costing helpful in sales price determination that will help to obtain a fair margin of profit, our first topic of discussion, therefore, will be a review of some existing practices:

1. Let us assume that "X" Company used no general accounting methods. On the basis that he was a small operator and could use his checkbook for all the data he needed, he did maintain a good record of shipments made. If this were the case, his cost of

EXHIBIT "J"
CASH BOOK AND EXPENSE DISTRIBUTION SHEET

A FIRST NATIONAL BANK C

B CAPITOL TRUST D

DATE	DR	CR	CK. NO.	BANK CODE	NAME AND EXPLANATION	EXPENSE BY COST CENTER				
						101	102	103	104	105
10-10		270.00	1	A	PAYROLL					
10-15		300.00			National Supply	160.00				140.00
10-16	500.00				Sales "B" Co.					
10-31		145.00			Hill Foundry Supply					145.00
TOTALS						$160.00				$285.00

EXHIBIT "K"

ESTIMATE SHEET—COST CARD

Customer

Pattern No. Date

Description

Pattern Equipment Flask Size

Core Equipment No. of Cores

Weight Each No. per Mold Est. No. Molds per Day

Metal Cost $

Alloy Cost $

% Shrinkage $

Metal Cost $

Melting Labor $ $

Melting Expense $ $

Total Metal Cost $

Molding Labor $

Core Labor $

Cleaning Labor $

General Labor $

Total Labor $

Expense $

$

$

$

$

$

Total Expense $

Total Cost $

% Profit $

Selling Price Ea. or Lb. $

sales billed would be less the accrual amount in payroll of $180.00 or $2445.00 for the 9350 lb, or $26.15 per cwt of castings produced. This is a difference of almost 10 per cent, the difference between getting and losing many jobs, and more than the net profit to most operators. Of course, it might be argued that this difference would not exist when the next month's totals and computations are made and that the general average would be satisfactory. We can only agree with this reasoning provided the shop is very specialized, handling one class of work and one kind of metal.

2. We have used as cost of production 9350 lb, for cost of sales, but returns and allowances were not given proper consideration. We know from our credit memorandum analysis that these amounted to $120.00. Let us assume the returns weighed 400 lb and that the net shipments, therefore, were 8950 lb. In this case, our cost per cwt of castings sold would then be $29.33, when approved accounting methods are used, or $27.32, where accrued amounts are not taken into consideration.

3. Now let us assume that the sales records are not properly maintained—that in order to save $20 to $25 in printing cost annually to provide proper forms, there is no delivery receipts system and that while you (*Please turn to page* 154)

FORECASTS

Favorable Foundry Operations

This analysis of the outlook for activity and employment in the foundry industry is from a report, "Employment Opportunities in Foundry Occupations," prepared by the Bureau of Labor Statistics, U. S. Department of Labor, and published in the December, 1945 issue of *Monthly Labor Review*. The study was made to provide information for the vocational counseling of veterans and other persons making the choice of an occupation

DEMAND for castings and the resultant volume of production that can be anticipated are determined primarily by two factors—the level of activity in the principal industries which consume castings and their relative use of castings as compared to parts made by other processes.

Few castings are sold directly to consumers as cast. Almost all are incorporated in producer durable goods, principally machinery and other equipment, and consumer durable goods such as automobiles and washing machines. Appraisal, therefore, of future castings production must necessarily be based largely upon an assumption as to the level of activity in the durable goods field. It has here been assumed that a high level of activity—at least equal to the best prewar years—will be maintained. The indicated outlook for employment would require modification should this assumption not prove true. The demand for castings is considered as covering all foundry production, both in independent and in "captive" plants.

Continued development of alternative methods of fabricating parts may also affect the volume of future requirements for castings. Fairly stable relationships have been maintained between the use of castings and such long-established processes as machining, forging, and rolling. Recently, however, other techniques, principally welding, stamping, and die casting, have made significant gains. The extent to which parts made by these methods are substituted for castings is dependent upon engineering and cost-accounting considerations applicable in specific cases. For this reason, the precise effect on the volume of castings production of increases in the use of these competing methods cannot be forecast. What can be done is to indicate the areas of competition and to suggest possible trends in a somewhat general way.

Die casting will compete with foundry operations only in the quantity production of small nonferrous-metal castings. The substantial expansion of die casting in connection with wartime demands for aircraft components may provide the basis for more intense rivalry in peacetime, but will affect only a small segment of the entire foundry industry. Die casting will also compete mainly with already mechanized methods, such as machine molding and the permanent mold process. For these reasons, foundry employment as a whole is not likely to be materially affected.

Welding made marked progress as a wartime substitute for casting in such applications as the manufacture of agricultural implements. Weldments have been employed in place of castings for machine-tool beds, although this use is still in the developmental stage. In some cases, welding may complement casting, in that the weldment is often built up from a number of individual steel castings. Experiments have indicated that welding provides greater economy in small-quantity fabrication, whereas casting results in lower costs in the longer production runs. In general, no major changes in the relative position of the two methods may be anticipated in the short-run period.

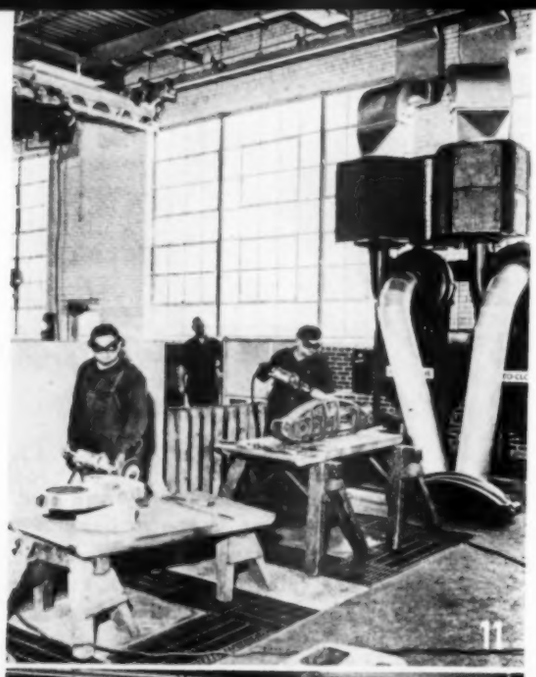
Parts stamped from sheet metal have displaced castings in some uses, particularly when the castings are of thin sections. In general, the method is confined to large-quantity operations, owing to the expense of setting up the necessary equipment, including dies. During the war, stamping made substantial gains in aircraft manufacture, partly as a result of the short supply of castings. In peacetime, further extension of stamping is indicated.

In projecting the production of castings it has been assumed that the demand for castings in the short-run period will not be significantly (*Please turn to page* 235)

TABLE I.—Trends in Production of Castings, by Selected Types, 1939-44

Type of casting	Production[1] (in net tons of 2,000 pounds) in— 1944	1943	1942	1941	1940	1939
Gray-iron (including cast-iron pipe and fittings)	[2]9,794,541	[3]	[3]	[3]	[3]	7,112,234
Steel[4]	1,843,386	1,928,645	1,679,178	1,316,027	797,947	594,147
Miscellaneous castings	1,505,379	1,679,981	1,369,826	844,217	507,692	400,465
Railway specialties	338,007	248,664	309,352	471,810	290,255	193,682
Malleable iron	889,820	849,764	768,496	843,038	565,923	480,578
Aluminum[5]	[2]213,700	[2]196,897	[2]134,066	[3]	[3]	[3]
Magnesium[6]	[2]99,564	[2]70,231	[2]21,622	[3]	[3]	[3]

[1]Data are from U. S. Bureau of the Census and War Production Board. [2]Shipments. [3]No comparable data are available for these years. [4]Castings produced for sale only. Data represent slightly less than 100 per cent of total tonnage sold. [5]Excludes die castings. [6]Excludes die castings. Includes the following quantities of magnesium incendiary-bomb body castings (in net tons): 1942, 4794; 1943, 38,680; 1944, 58,755.



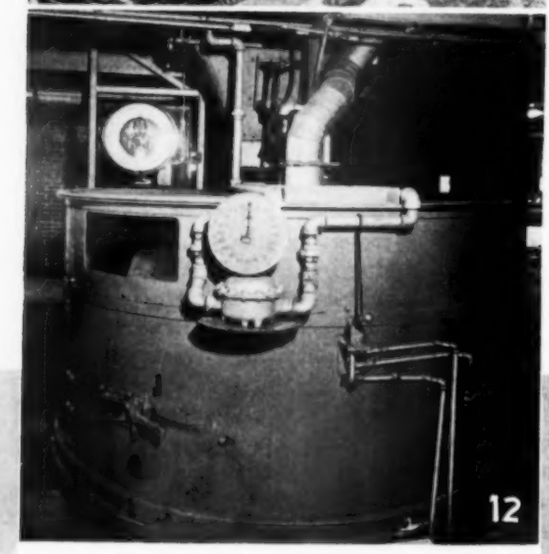


Fig. 11—Floor grilles have been installed by many machine tool manufacturers for controlling dust released during finishing of large castings

Fig. 12—Dust hood to enclose the sand mixer is standard equipment supplied by most mixer manufacturers

Fig. 13—Enclosure for stave mills

Fig. 14—Transfer points of belt and bucket conveyors

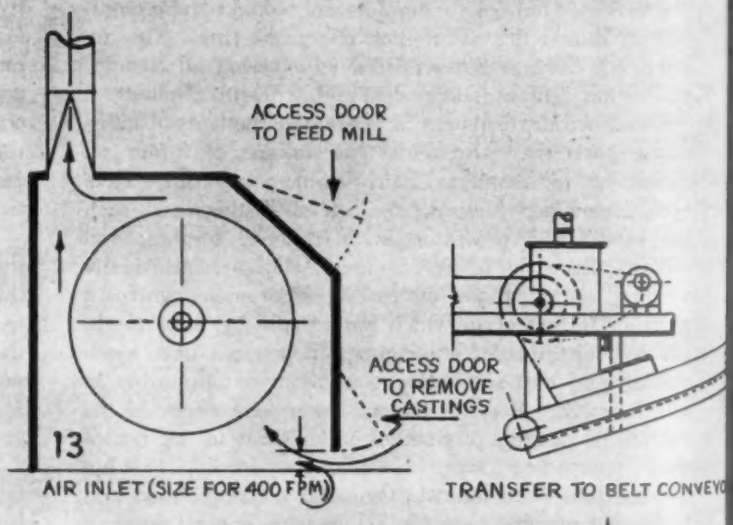
Fig. 15—Sketch showing typical foundry sand system

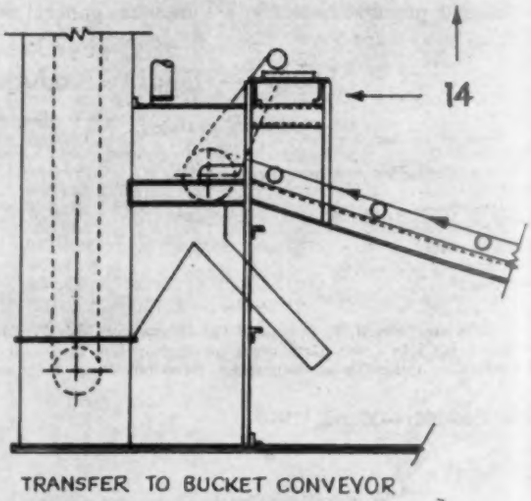
Fig. 16—Shakeout cycle in large steel foundry. In 1 hr 45 min 1,480,000 cu ft (A) could be saved if exhaust volume reduced from 40,000 cfm to 10,000 cfm during idle periods. Additional 479,000 cu ft (B) could be saved if exhaust system was stopped during idle periods

FOUNDRY

In this second of two articles describing methods of controlling dust and fumes in various foundry operations, the author discusses ventilation requirements of sand systems, molding floor and cleaning room

A SCHEMATIC sand preparation system is indicated in Fig. 15, and while there will be variation in location, construction, and total amount of equipment employed, this schematic system will indicate the typical points of dust generation, and facilitate a discussion of their control. Determination of exhaust volume for each point can be reduced almost to data book figures, as there is little variation in conveyor





VENTILATION

By JOHN M. KANE
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Louisville

sizes, elevator cross section, and method of enclosing screens, sand bins, and mixers. No little credit for this simplicity is due the manufacturers of the sand preparation equipment, as they have provided complete enclosures wherever possible and have included hood constructions that facilitate effective dust control and ease of connection to an exhaust system.

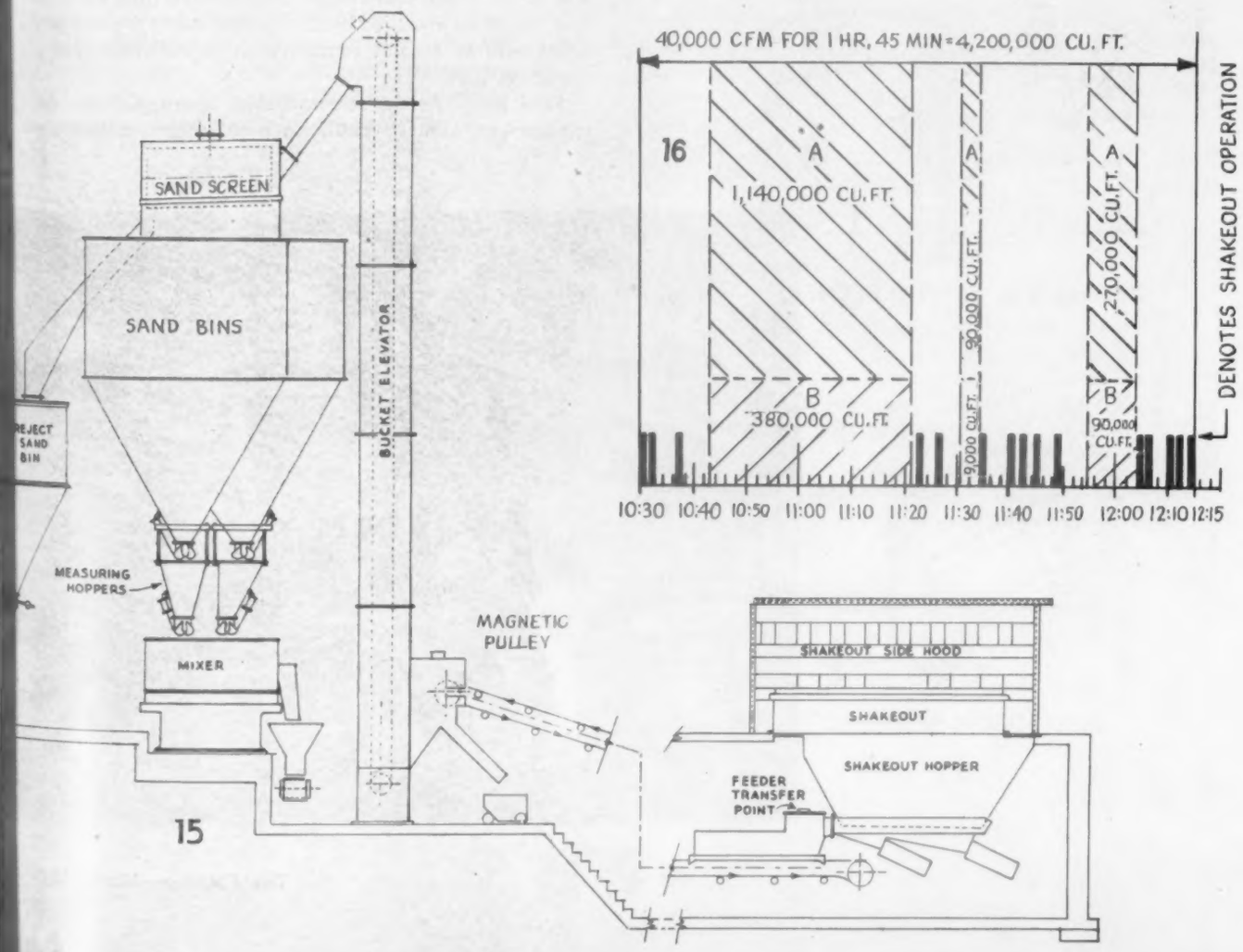
Dust generation will normally stop after water has been added to the sand in the mixer; the thorough mixing at this point leaves the sand damp and prevents dust dispersion as the conditioned sand is conveyed to the molding stations or molding floor.

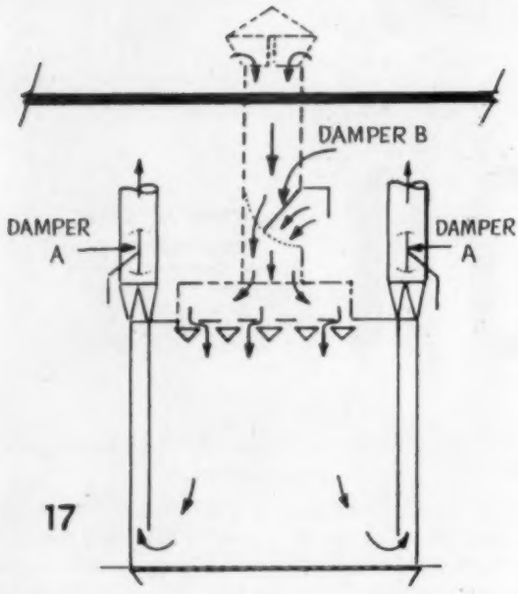
Transfer points, Fig. 14, can be described as those places where the return sand is fed to or from a conveyor or feeder. Dust will be produced in these transfers, which occur at feed from shakeout hopper to return sand conveyor; conveyor to elevator boot; elevator head to belt conveyor; and often from one conveyor to a second.

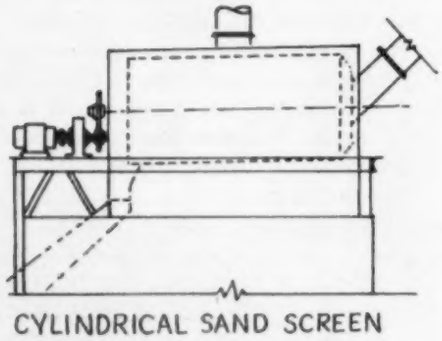
Sand from the shakeout hopper is either fed directly to apron or belt conveyor, or by apron or vibrating feeder. An exhaust connection at this point is necessary and where feeders are employed, volume should be increased 25 to 50 per cent over the minimum requirements for transfer points.

Conveyor from shakeout frequently is enclosed to control steam, smoke, or heat radiation during the transfer of the hot sand. Exhaust connection from this enclosure seldom is required unless conveyor is longer than 30 ft, as the enclosure over the rising belt acts like an enclosed stack directing released products to the exhaust connections at the conveyor head pulley.

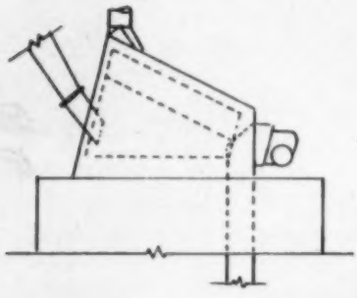
A magnetic pulley usually is installed as the head pulley at the transfer to the elevator boot and removes gaggers,



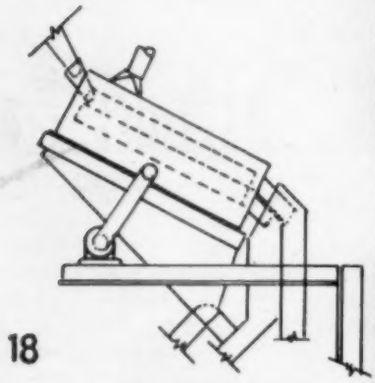




CYLINDRICAL SAND SCREEN



HEXAGONAL SAND SCREEN



FLAT DECK SCREEN

tramp iron and other metallic pieces from the sand. There are larger openings on the under side of such hoods, and an increase in exhaust volume at this transfer is recommended.

Elevators: Air is exhausted from the elevator casing to prevent dusting out through openings in the case and to prevent condensation on the interior walls. With the stack effect of a bucket elevator, the exhaust connection is made at the head.

Sand Screens: Sand screens, Fig. 18, can be of the flat deck vibrating type or of the rotating cylindrical or hexagonal design. They scalp oversize lumps, and the rotating designs have some added advantages in breaking core lumps, thereby salvaging a portion of the sand that would otherwise be rejected and wasted.

Dust generation during screening is more pronounced than at any other step after the actual shakeout operation, and ample exhaust ventilation is essential . Where removal of fines is desired, the screen offers the best place to get the necessary air movement through the opened sand. This is especially true of the cylindrical or hexagonal screens, where air can be exhausted through the cascading sand in the rotating screen section. Exhaust air requirements will frequently be in excess of the quantity needed for dust control to provide the fines removal function.

Screens normally are located above the sand storage bins, and the rejects chuted to a tote box on the ground floor or to a waste sand bin. While exhaust ventilation is seldom provided at the tote box, there are occasions where considerable dust is released in this area. Where this occurs, the indraft through the reject chute produced by the suction connection at the screen will have but little effect. Use of a covered tote box, a canvas sleeve from chute to tote box, or an overhead hood close to the box top and provided with an exhaust connection is indicated for such a condition.

Sand Bins: As the screened sand is dropped into the storage bins, exhaust ventilation is required to remove the

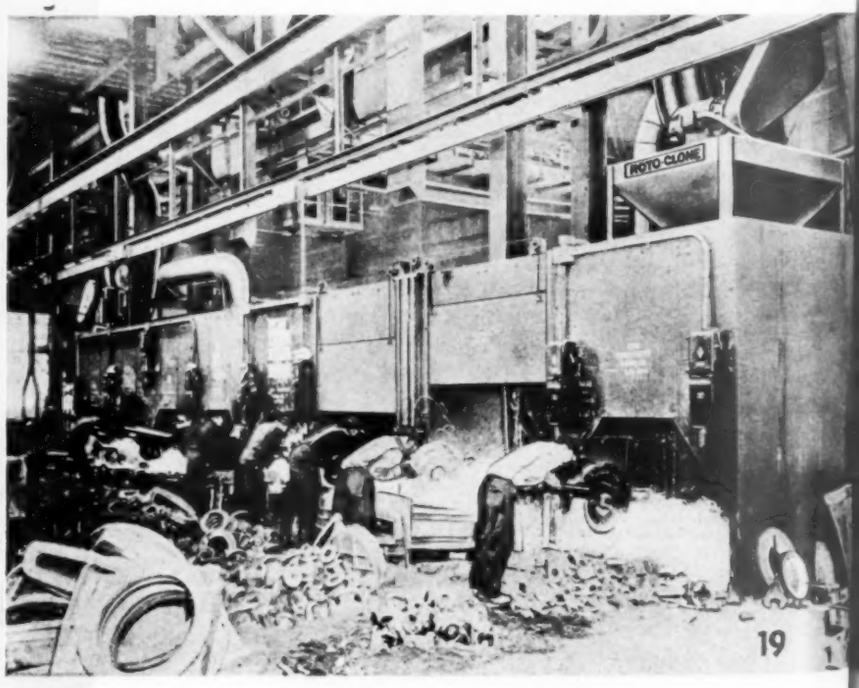


TABLE I—Exhaust Volumes for Sand Preparation Equipment

Equipment	Minimum Exhaust Requirements	Usual Minimum Branch Diameter	CFM
Transfer Points	350 cfm per foot of belt width but not less than 150 fpm indraft	6"—Usual tranfer	690
		7"—Feeder from shakeout hopper	940
		8"—Magnetic pulley at elevator boot	1220
Bucket Elevators	Exhaust from elevator head 100 cfm per sq ft of casing cross section	6"	690
Sand Screens	Flat deck—50 cfm per square foot of screen area but not less than 200 fpm indraft Cylindrical—100 cfm per sq ft of screen cross section Volume may be doubled to provide required fines removal		
Sand Bins	150 fpm indraft but not less than 0.5 cu ft per cu ft bin capacity	7" per bin	940
Sand Mixers	150 fpm through openings in dust hood	5" for 4' diam mixer	480
		6" for 6' diam mixer	690
		7" for 8' diam mixer	940
		8" for 10' diam mixer	1220

For above applications, conveying velocities in branch and main ducts of 3200 to 3800 fpm is recommended.

displaced air and to prevent bin sweating. If the screen is located directly over the bin, exhaust from screen will be sufficient to give satisfactory control. Where sand is plowed from the conveyor belt, exhaust connection should be made at the bin side removed from the feed openings in the bin. Air circulation is thereby obtained with pickup of a minimum amount of sand particles.

Sand Mixers: All manufacturers of sand mixers or mullers provide an effective dust hood, Fig. 12, for their equipment. Exhaust ventilation is required only to maintain an indraft through feed opening and inspection door. Some mixers are designed with a rotating pan that necessitates clearance between the pan and the dust hood. This opening may be as wide as 6 in. around the entire pan circumference and large exhaust volumes will be required for mixers of such construction. Reduction in clearance between hood and pan will permit corresponding reduction in those ventilation volumes.

Mixers are also provided in many foundries with an arrangement for blowing or exhausting large air quantities during certain portions of the mixing cycle for sand cooling or fines removal. Obviously such accessory provisions will greatly influence the volume of air exhausted.

In a system with a single mixer and a single sand storage bin, the mixer can be located beneath the bin and a clam shell gate discharges the sand for each batch directly through the feed opening in the mixer dust hood. In larger systems a weigh lorry will usually deliver the sand from one or more bins to one of several mixers needed to prepare required sand quantities. This introduces the additional transfer from bin to weigh lorry or batch car, and an exhaust at each bin gate is indicated, although amount of

Fig. 17—Heat savings in blast room. Damper A is interlock to close partially when blast room doors are open. Damper B is regulated to keep supply air temperature low as practical

Fig. 18—Enclosures for various sand screens

Fig. 19—Booth type exhaust provides practical dust control method for most swing frame grinding operations

Fig. 20—Exhausted booth type enclosures allow wide variation in casting size and shape and reduce noise in the cleaning room

Fig. 21—Downdraft benches for portable and flexible shaft grinding can include air moving and cleaning equipment in their design

dust generation is relatively small. The use of mechanisms, lever, air or motor driven, designed to open blast gates in such branches only when material is delivered from a given bin has proved cumbersome and uneconomical for the relatively small exhaust volumes involved.

It will be noted that sand conditioning and handling equipment from shakeout to sand bins will be in service during the shakeout cycle. The feed from sand bin to mixers is tied to the molding cycle. Where the two cycles are not simultaneous, a separate system for mixer and bin discharge exhaust points will prove economical.

New Sand: Periodic additions of new sand are required in any sand system, but the quantity and frequency of addition is subject to wide variation. In some cases, new sand is delivered through an auxiliary floor grate to conveying equipment for shakeout sand. In other cases separate systems of conveyors, elevators, and storage bins are employed. Need for exhaust ventilation is subject to judgment on each installation, but normally is not required due to infrequent intervals of short duration that new sand is introduced to the foundry equipment.

Exhaust Volumes: Recommendations for the various operations in a sand preparation system have been listed in Table I. Experience has tempered the basic design figures indicated there, and in one column minimum branch size and exhaust volume recommendations have been listed which may exceed the basic requirements. When dealing with such extreme variables as encountered in foundry practice it is good engineering practice to provide for extreme conditions for the operations listed, as the slight increase in exhaust volumes represent a very small percentage of total requirements for the system. The cost of possible change in duct sizes after a system has been installed is sufficient justification for the added factor of safety employed.

Recommended conveying velocities in branch and main ducts are from 3200 to 3800 fpm, as indicated in Table I.

Tunnel Ventilation: Earlier considerations of exhaust ventilation for sand preparation systems seldom considered shakeout tunnel ventilation, except for exhaust volumes from incidental feed or transfer points within the tunnel.

Dust generated from spillage and falling sand from under side of conveyors, produces a dust concentration often excessive for the maintenance personnel. In long tunnels smoke, fumes, and heat can be oppressive.

Shakeout tunnels can be grouped roughly into two basic designs: (1) short, with the shakeout conveyor rising to floor level just beyond the shakeout; and (2) long, with a conveyor handling sand from one or more shakeout hoppers and running under ground for considerable distance to the sand preparation equipment. For the short tunnel, the exhaust volume from local hoods should be supplemented by additional general ventilation to provide a total volume equal to from 75 to 100 cfm per square foot of tunnel cross section. Supplemental exhaust should be removed from ducts close to the back wall of the tunnel, to create a horizontal air flow the length of the tunnel. This supplemental exhaust volume is also often helpful in controlling dust in the area of the tramp iron box beneath the magnetic pulley at the elevator boot.

For long tunnels, the exhaust of the supplemental volumes for tunnel ventilation from ducts at the far end has not proved too effective, especially where heat, smoke, and fumes that arise from the belt conveyor must be controlled. Better control is provided by exhaust openings in the duct on approximately 20-ft centers, running the length of the tunnel with the total exhaust volume from the tunnel area not less than one air change every five minutes. Makeup air will enter at tunnel ends and frequently around shakeout hoppers. Additional openings may be required to provide desired air distribution.

Some Exhaust System Problems: Several special problems in connection with exhaust system application that justify some discussion:

1. Sand Loss. In confining dust at the various points in a sand preparation system, some usable grain sizes of sand will be picked up with the find dust producing fraction. This is especially true in steel foundries where additional air is exhausted to remove fines.

In most systems, the loss of good sand through the exhaust system is not sufficient to make any attempt to reclaim it feasible. New sand added to the system for desired sand properties, makes up the loss from this source.

Difficulty may be experienced in some gray iron, malleable or nonferrous systems where permeabilities must be kept at a high figure to produce proper finish. If sand is relatively hot and dry coming (*Please turn to page* 144)

TABLE II—Exhaust Requirements for Stave Type Tumbling Mills

(House and provide inlet openings in bottom of front side of housing. Inlet velocities not less than 40 fpm. Conveying velocities in branch and main connection of 3200 to 3800 fpm is recommended.)

Inside Diameter of Stave Mill		CFM To Be Exhausted for Mills Not Over 70" Inside Length*
Side of Square Mill	Diameter of Round Mill	
. . . . .	Up to 24" incl.	800
Up to 24" incl.	Over 24" to 30"	900
Over 24" to 30"	Over 30" to 36"	980
Over 30" to 36"	Over 36" to 42"	1335
Over 36" to 42"	Over 42" to 48"	1747
Over 42" to 48"	Over 48" to 54"	2210
Over 48" to 54"	Over 54" to 60"	2725
Over 54" to 60"	Over 60" to 66"	3300
Over 60" to 66"	Over 66" to 72"	3925
Over 66" to 72"	. . . . .	4610

* For mills longer than 70 in. increase the rate of ventilation over the above values in direct proportion to the increase in length.

A Doctor Discusses FOUNDRIES

Writing from his intimate knowledge of hazards in various types of industrial occupations, the author refutes some of the common notions regarding the undesirability of foundry work. This paper was presented before the annual convention of the Gray Iron Founders' Society

By JAMES E. MULLEN, M.D.
Toledo, O.

FOR a variety of reasons the foundry industry lately has come to be regarded as an undesirable place of employment. The expression "hot, heavy and dirty" has been used in criticism of the industry. The recognition of silicosis as a compensable disease, and the fear of it, have kept many men from entering an interesting and necessary field. It is my purpose to review some of the hazards of the industry and to show that the foundry *is* a good place to work.

Injury hazards caused by unsafe working conditions need not be great, and practically all can be removed by the use of obvious and well-known methods. A high percentage of injuries of this kind can mean only poor plant supervision.

Injury hazards due to defective physical conditions existing in the worker can be prevented only by proper examinations before employment, and suitable job placement thereafter.

Hazards Can Be Removed

The adequately supervised foundry will keep the aisleways clear of debris, the atmosphere well ventilated, and the right man on the right job. Loose sand on the foundry floor has been responsible for hernias when the worker who is carrying a heavy casting slips; molten metal burns, when the pouring man slips. Improperly stacked piles of materials and irregularly placed equipment are responsible for foot and toe injuries and a multitude of bodily bruises. The importance of clear aisleways is just as necessary to the operation of the crane as it is to the operation of factory trucks where, in both instances, the safety of the man on the floor and the man on his feet is of the first importance.

Ventilation, a hazard about which foundrymen are most familiar from the standpoint of silicosis, is not merely that. Smoky and dusty areas prohibit good vision. Smoke and dust-laden air irritate the membranes of the eyes, nose, throat and bronchial tree and produce chronic, if not disabling conditions. Properly placed fans can dispel these areas quickly and often need be in use only during the period of certain operations. Ventilation and its relation to silicosis will be discussed later.

As to the problem of heat hazard, I do not believe that it is as bad as it sounds. Exposures to high temperatures are not common to all of the workers. The human body is well able to adjust itself to the circumstances of heat, and the simple preventive of the use of salt tablets should put this hazard in a very low category. I do not know of a single case of heat exhaustion occurring in the foundries under my observation in the past four years.

Exposure of the worker to sudden and extreme changes in temperature is, however, a real hazard from the standpoint of lost time. The common cold, sinusitis, tonsilitis, bronchitis and pneumonia all have in their history the story of such exposure. These diseases are responsible for much lost time and I do not know of any of them being compensable. A worker should not be asked to go immediately from a hot pouring operation to work outside the main building during cold weather. Plant doors should be preceded on the outside by canvas baffles to prevent the sweeping cold drafts that come through doorways which, of necessity, must be kept open. Loading and unloading operations should be done either within the plant or at an outside dock, but never with a truck backed halfway through the doorway.

Placement of operations is important in the reduction of hazards, especially those due to chipping and grinding. It has been my happy personal experience to reduce the incidence of eye injuries in a certain foundry by the simple suggestion that the grinders be placed in a single row, rather than a double row facing each other. Not withstanding the fact that the grinders wore their safety goggles while grinding their own casting, they removed their goggles to inspect the casting and thereby were exposed to the flying particles from the grinder across the bench. Metal fragments from chipping often injure the workers in the vicinity. They can easily be protected by proper screening about the chipping operations.

(*Please turn to page* 152)

Practice on Bath Tub Molding

Q.—Do you have information on methods and equipment employed in the manufacture of bath tubs in United States foundries? Impression seems to prevail here that American tubs made before the war, were rather heavy. The molds were not hand finished as in British and European foundries, and the castings were gated along the bottom edge or roll rim.

A.—Hand finishing and a coating of plumbago according to European foundry practice produced a thinner wall and consequently lighter tub than the American counter-

part in which the metal is poured against untouched and untreated sand. The feature is controversial and has served as a subject in several interesting papers. Carbon in any form prevents proper adhesion of the enamel. The argument hinges on whether the saving of a few pounds of metal offsets the additional time and expense involved in cleaning the surface of the casting made in the hand finished and blacked mold.

The claim that gating the casting along the roll rim increases the weight through mold strain is open to question. Where the sand is rammed to proper density at the joint of the flask in the vicinity of the gates, the amount of resulting increase of weight and thickness is negligible. In this connection it is interesting to note that the practice of gating along the lower rim and thus forcing all the metal to rise in the mold, represents the practical molder's fear that if the metal entered the mold at the top it would cut or wash the surface of the sand dome forming the inside of the casting. Instead of using a more refractory and higher grade sand, the easier and more convenient technique of gating the casting along the lower rim was followed.

In recent years with a better knowledge of sand properties the castings are gated on top through a number of small wedge gates. Cast iron tubs are made in great numbers in the United States. The metal thickness is ¼ in. The former type 5 ft tub with roll rim and resting on four feet is almost obsolete. Present tubs are of the built-in type, apron tubs, in all shapes and sizes. The ordinary plain 5 ft apron tub weighs 360 lb. This is shipping weight with a coat of enamel.

Chill and Wedge Bar Control

Q.—Can you give us some information on chill and wedge bars as a means of control?

A.—Chill and wedge test bars are used in many gray iron foundries as a means of determining the suitability of the iron for certain types of castings. The chill bar as the name indicates is cast against a chill while the wedge bar is cast in green or dry sand. One type of bar used is ¾ x 2½ x 5 in. with the narrow face cast against the chill. An open sand mold usually is employed and after the bar has cooled to below a dark red heat it is quenched in water. Then it is broken along the longest dimension and the fracture examined for appearance, particularly depth of chill.

Wedge bars vary in size and no chill is used. Usually it is preferable to use a core mold to eliminate variations in moisture content of the sand. The wedge bar might be 3 in. wide, 4 to 6 in. long, and 1 in. thick at the heavy end tapering gradually to a knife edge at the other. Like the other bar, it is split along the long dimension for examination of the chill portion.

Use of chill or wedge test bar is based upon experience with laboratory and practical data. In other words you know that certain compositions or mixtures give good results in certain castings. The test bars show certain chill depths for the particular mixtures. Hence, over a period of time you are able to correlate the relation of chill and casting, and then can determine by the chill alone whether the iron is suitable, and can make adjustments by additions of silicon or other alloys to the ladle. Such bars are particularly valuable when several different mixtures are melted in the cupola since they quickly show the change in structure.

Seeks Data on Permanent Molds

Q.—Can you suggest titles of books or other literature covering the subject of permanent molds for making iron castings?

A.—So far as we know up to the present no book has been published dealing exclusively with the subject of permanent molds. Several books have been published on die casting methods and equipment. Fundamental differences between the two fields of casting technique lie in the fact that in die casting the metal is forced into the mold under pressure, temperature of the metals used in die casting is far lower than the temperature of molten iron, and die

casting, as generally understood, is confined to small castings. However, many features are similar. The same observation applies to permanent molds employed in the production of ferrous and nonferrous castings, where the metal is poured into the molds by gravity.

Permanent molds also are employed in the production of ferrous and nonferrous castings by the centrifugal process. In one method the interior surface of the mold is bare. In the other method the mold is lined with sand. During the past few years the subject has been dealt with extensively in THE FOUNDRY and other technical publications. Papers have been presented at meetings of the American Foundrymen's Association and later incorporated in the *Transactions*. Articles describing two prominent foundries in which iron castings are made in permanent molds appeared in THE FOUNDRY for June, 1933 and May, 1932.

Has Trouble in Casting Monel

Q.—We are making some monel metal castings but find that after taking a machine cut, spots show up with a grav dust on the surface. The castings are wedges 11 in. long, 5¼ in. wide, 1 in. at the heavy end and ½-in. at the other. Metal was melted under glass with the casting gated in 4 places from a runner at right angles to that from the sprue. We want to use ingot monel with the following composition: Fe 1.5 per cent; Al 3.25 per cent; Ni 30 per cent, and Cu remainder.

A.—You do not mention the use of any deoxidation or degasification procedure, and we believe that your trouble with the monel metal arises from neglect of that step. Both monel metal and nickel must be treated with metallic magnesium just prior to pouring to eliminate any gases picked up during melting. Amount used is 0.1 per cent or slightly more than 1½ oz per 100 lb of metal. It is placed in a holder of some type so that it can be plunged beneath the surface and held there until action ceases.

Apparently type of monel is that designated as "H", and the analysis you give should show 3.25 per cent Si instead of Al, and the nickel and copper contents should be interchanged. The alloy also contains around 1 per cent manganese.

Usual procedure is to melt the monel metal as rapidly as possible to reduce unnecessary exposure to furnace gases. About 3 to 5 minutes before pouring about 0.5 per cent manganese should be added either as manganese metal or in the form of low-carbon, 80 per cent ferromanganese. Then the silicon in the form of 95 or 97 per cent silicon metal is added to bring the silicon up to the desired point. Final deoxidation and degasification is accomplished just before pouring by the addition of magnesium metal as mentioned earlier. Glass makes a suitable cover for monel melting.

Long Heat Clogs Small Cupola

Q.—On heats up to 4 tons everything works nicely in our 30-in. inside diameter cupola. Recently we increased production to 6 tons or more and are having constant trouble. The last charges melt very slowly. The material becomes jammed in a solid mass and does not fall out when the bottom is dropped. We shall appreciate your opinion on the cause and the remedy for this condition.

A.—Since you do not furnish details on the main factors, weight and composition of the iron charge, amount of coke, height of bed, volume and pressure of blast, we are handicapped in offering a specific opinion. The trouble may be caused by any one or by a combination of the foregoing factors. Therefore, we shall approach the problem from another angle and outline the proper procedure. Operated properly, a 30-in. inside diameter cupola should melt 7000 lb. per hr. For a 6-ton heat that means that the cupola is in blast for about 2 hours.

During this period blast is supplied at the rate of 1400 cfm and at a pressure of 8 to 10 oz. The coke bed extends upward 36 in. above the tuyeres and is well burned through before the last layer of coke, corresponding to one of the regular coke charges is laid on. The cupola then is filled to the door with alternate layers of iron and coke, 500 lb iron and 60 lb coke. The iron is broken into reasonably small pieces and the coke is from 3 to 4 in. The blast can be turned on immediately after the cupola is filled, but better results are had with the first iron, if the charge is allowed to soak for ½ to 1 hr. before turning on the blast.

A shovelful of limestone, 15 to 20 lb is spread over each charge. The limestone unites with the coke ash and other impurities and forms a slag that flows out through a hole in the back of the cupola, 3 in. below the tuyeres and opposite the spout. Some melters prefer to drain the slag through the tap hole. That is a minor detail. The really important item is the rapid formation of slag in the melting zone of the furnace, and the equally rapid removal of the slag from the bottom. In this manner the cupola is kept clean on the inside and will keep on melting for an indefinite period providing proper attention is given to all details.

GANGWAY! By J. A. Patterson

"He can't hit a thing without it!"

Aluminum Ring Casting Is Hard To Make

Q.—We are having difficulty in casting in aluminum a circular plate 24 in. diameter, 3/16 in. thick with a boss about 2 in. diameter in the center, a ½ in. rim around the periphery, and a concentric ring about ½ x ½-in. approximately halfway between center and rim. We find that no matter how hot the metal is, it chills before it covers the entire surface. We know that iron foundries use a certain chemical to help the metal run freely, and would like to find if there is something similar for aluminum alloys. Any help in solving our problem will be appreciated.

A.—Pouring a casting 24 in. diameter and only 3/16-in. thick would be trying even to the most experienced. It would be nice if there was some ingredient which could be added to aluminum to make it more fluid so that it would flow farther, but so far as we know none is available. Of course, some aluminum alloys possess better casting characteristics than others, so there is some choice provided that those coincide with other desired properties of the alloy. You do not mention the alloy you are using, but our suggestion would be the 5 Si-95 Al or possibly the 3 Si-4 Cu-93 Al alloy. With reference to fluidity, we are assuming that the metal is clean and not contaminated with oxides and dirt. If the latter is the case, use of a good flux cleaner will be a decided help. Names of manufacturers of such fluxes may be found in the advertising pages of THE FOUNDRY.

Several possibilities for molding the circular plate are available, and since you do not mention what methods you have tried, we will mention several, and you can try any or all. While somewhat unorthodox as far as aluminum is concerned, we believe that a trial of pouring down a central riser would be worthwhile, since it does not require any change on the pattern, and does have the merit of the shortest flow of metal as well as putting hot metal where it is needed the most. Procedure is to place a rectangular or square riser over the boss with a perforated metal screen or core at the mold joint to act as a skimmer and choke. Since considerable metal will flow over the mold face below the boss, it is advisable to place a core at that point to prevent cutting or erosion from the metal. Build a reservoir basin or trough from the riser opening to the edge of the mold so that it is not necessary to pour the metal from any height.

The orthodox method of pouring a large plate would be to make two semicircular branches with sprues at opposite corners of the mold with a riser over the boss, and possibly four small risers equally spaced on the ring between boss and rim. Branch gates lead from the runners, and those would be about 6 in. apart with two about 3 in. circumferentially on both sides of the sprues, etc. Another possibility which might help with your present practice is to skin dry the mold face. That would reduce the rate of heat extraction from the metal, and permit it to flow farther. Likewise a core forming the bottom would have the same effect. Still another method would be to use a plaster or gypsum cement mold.

Methods for Estimating Weight of Casting

Q.—We shall appreciate information on recognized methods for estimating the weight of castings.

A.—Articles on this subject have been presented in THE FOUNDRY on several occasions. An exceptionally clear and detailed exposition was presented in the Data Sheets of the October and November, 1945, issues. Estimates of weights placed on drawings are not always accurate or reliable. To determine the weight of a casting with reasonable precision it is necessary to separate the casting into a number of geometrical solids of simple shape in which the volumes can be determined. The volumes are added together and the volumes of the hollow parts are deducted from the total. The result is set down in round figures to account for fillets, etc.

The figure then is multiplied by a constant, in this instance the weight of a cubic inch of the metal involved, 0.26 for cast iron, 0.28 for steel and 0.30 for most of the bronzes. A safety factor of 2 to 15 per cent is added to take care of contingencies. At this time, it is usual to estimate the amount of metal required to fill the sprue, gates and risers. Obviously, the separation into elemental volumes must be done judiciously. The estimator must be very familiar with foundry practice to apply corrective factors where necessary. Sometimes it is possible to apply a simple calculation by simplifying the shape of the pattern.

Some guess work is involved and the result is not precise. In some instances the weight of the casting may be estimated from the weight of the pattern. This method may be difficult to apply where the casting contains many intricate cores. A fairly common method is to compare the weight of the proposed casting with the weight of a somewhat similar casting of which the weight is known. For a plain casting without cores the pattern may be weighed and the weight of the casting may be estimated by consulting a table of coefficients.

Sand Coating Prevents Sticking of Parts

Q.—We are making some swivel hook castings, and are having difficulty in that the graphite coating used does not adhere properly. Can you tell us what kind of a coating will result in the body being free in the ring?

A.—Practically universal practice in foundries where swivel hook castings are made in large quantities is to coat the insert part of the stem with fine sand. These devices are the result of two and not of a single casting operation. The links, eyes or hooks forming an extension to the swivel bar are cast first. After thorough cleaning the neck of the bar is dipped in core oil, and then into any suitable receptacle filled with fine sand which results in a thin film of sand adhering to the oil. After the coating has been dried thoroughly in the core oven, the prepared castings are placed in a second mold provided with cavities for their reception in proper relation to the mold cavities for the remaining part of the assembly. Following pouring, the thin film of sand disintegrates and runs out when the completed castings are cleaned in the tumbling barrel. This practice and also the use of clay follow boards as followed in a prominent midwestern malleable iron foundry were described and illustrated in the June, 1933, issue of THE FOUNDRY.

Desires Information on Annealing Costs

Q.—We operate a job foundry in Denmark and are planning the production of malleable, steel and gray iron. Can you tell us which type of annealing oven is most suitable for treating 300 tons of malleable and 300 tons of steel yearly. Presumably, it would be a box type which could be fired with oil, stoker coal or electric power. Can we avoid oxidation and by that save cleaning when we carry out annealing in the electric furnace?

A.—Determination of the most suitable oven for the heat treatment of steel and malleable castings depends upon a number of factors rather than just one, and all must be considered in making the final decision. First cost is important, but that may be outweighed by such points as ease of control, rate at which the furnace can be heated and cooled, refractory costs, maintenance, availability of fuel and fluctuations in its price, whether or not the castings must be protected against furnace atmosphere, etc.

As far as fuel costs for heat treating or annealing malleable iron are concerned the following figures can be used for estimation purposes, but it must be remembered that they only are averages.

(*Continued on page* 114)

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ASSURES CONSISTENTLY BETTER CASTINGS

Large or small . . . for all castings in which your customers demand improved physical properties, increased pressure requirements or greater wear resistance . . . Nickel will help you satisfy these demands.

Nickel also serves as a valuable tool within the foundry itself by alleviating such problems as porosity, shrinkage, chilled corners and edges and non-uniformity in castings of irregular section or unusual design.

Suitable forms of Nickel and Nickel alloys have been developed to simplify its use by both ferrous and non-ferrous foundrymen.

★

Our technical staff and the casting specialists of our distributors have had many years of experience with foundry problems. They will welcome the opportunity to cooperate with you.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

(*Continued from page* 112)

and will vary from plant to plant. For oil-fired furnaces fuel consumption averages 75 gal per ton; for hand-fired coal consumption it is 1000 lb per ton; for powdered coal fired ovens consumption is 500 lb per ton, and for electrically heated ovens consumption is 475 kwh per ton. We do not have any data on stoker firing, but the cost will lie somewhere between powdered and hand-fired coal.

Your reference to avoidance of oxidation and saving in cleaning is not quite clear. If you mean complete elimination of oxidation and consequently cleaning, the answer is no, since it is impractical to prevent oxidation. However, by use of controlled atmospheres where castings are not packed in pots, and careful attention to luting the pots where they are used, oxidation or scaling is held to a minimum so that the castings are cleaned easily in a short time by tumbling or abrasive blasting or a combination of both.

Interested in Molding Magnesium Castings

Q.—In buying scrap cast aluminum we have accumulated a quantity of magnesium alloy, and we are intrigued with the idea of making sand castings of it, provided it is not too difficult. Therefore, can you give us any information on how the metal can be melted and poured safely?

A.—Production of magnesium castings is not quite as hazardous an undertaking as some popular versions might indicate, provided attention is given to certain details which will be mentioned later, but it will require considerable experimental work to gain the necessary experience to produce sound castings. Melting of scrap usually is accomplished in oil or gas-fired furnaces with cast steel pots holding from 300 to 600 lb.

Best procedure would be to place some propritary refining flux in the bottom of the melting pot or crucible which has been raised to a red heat or better, and then add a small amount of the heaviest section, clean dry scrap. Allow it to melt and then begin to add additional amounts of clean, dry scrap, pushing it down into the molten heel so that it melts more rapidly. Do not add too much at one time, and see that the bath is well covered with flux by suitable additions from time to time. When the crucible is filled within 4 or 5 in. of the top, the molten bath is stirred well to promote good contact between flux and metal. If the scrap is particularly dirty, it is dipped out into another clean crucible containing fresh flux—leaving the sludge and dirt behind in the first. After thorough stirring or puddling the metal is ready to be dipped out and poured.

Since megnesium alloys react readily with moisture in sand, some type of inhibitor or protective agent is mixed with green sand. Common agents are sulphur, boric acid, ammonium silico-fluoride, etc., and in some cases diethylene glycol is used to replace part of the moisture. Inhibiting agents range from 4 to 10 per cent by weight of the sand depending on the sand and the section thickness of the casting. Cores likewise must contain an inhibiting agent.

Magnesium alloys have a low heat capacity, and low specific gravity. Hence, careful study must be made of proper

gating and risering to secure sound castings. Where possible castings are gated so that the metal enters at the lowest part and flows without turbulence into the cavity. Multiple gates and numerous feeding risers are usual practice. Cast iron chills also are employed widely to insure progressive solidification. Filters which may be perforated metal skim gates or steel wool, are placed at the bottom of the sprue or in the main runner to keep out oxide skins, and pouring basins are used to promote smooth flow of molten metal into the sprue. To prevent burning of metal, powdered sulphur is sprinkled over the metal in the ladle, and during pouring more sulphur is sprinkled over the stream emerging from the ladle.

The foregoing is a brief summary of various features of melting and casting magnesium alloys. For more detailed information we suggest that you study the following articles which have appeared in THE FOUNDRY: "Producing Magnesium Castings," February and March, 1943; "Cores for Megnesium Castings," April and May, 1943; "Molding Sand Practice for Magnesium Foundries," June, 1943; "Magnesium Fires Can Be Prevented," October, 1943; "Producing Magnesium Castings," April and May, 1944; "Selecting Inhibitors for Magnesium Molding Sands," December, 1944 and January, 1945; "Heat Treatment of Magnesium Alloys," April, 1945; "Gating, Risering and Chilling of Magnesium Sand Castings," May, 1945; "Magnesium Castings for Aircraft Engines," June and July, 1945, and "Collection and Disposal of Magnesium Dust," July, 1945.

Finishing and Coloring Of Bronze Tablets

Q.—Several years ago we had some correspondence with you regarding the casting, cleaning and coloring of bronze memorial tablets. You stated that feature articles on the subject had appeared in the Sept., and Oct., 1934 issues of THE FOUNDRY. If copies are still available we should like to have a copy of each. We also should like to know of any other literature or books on the subject.

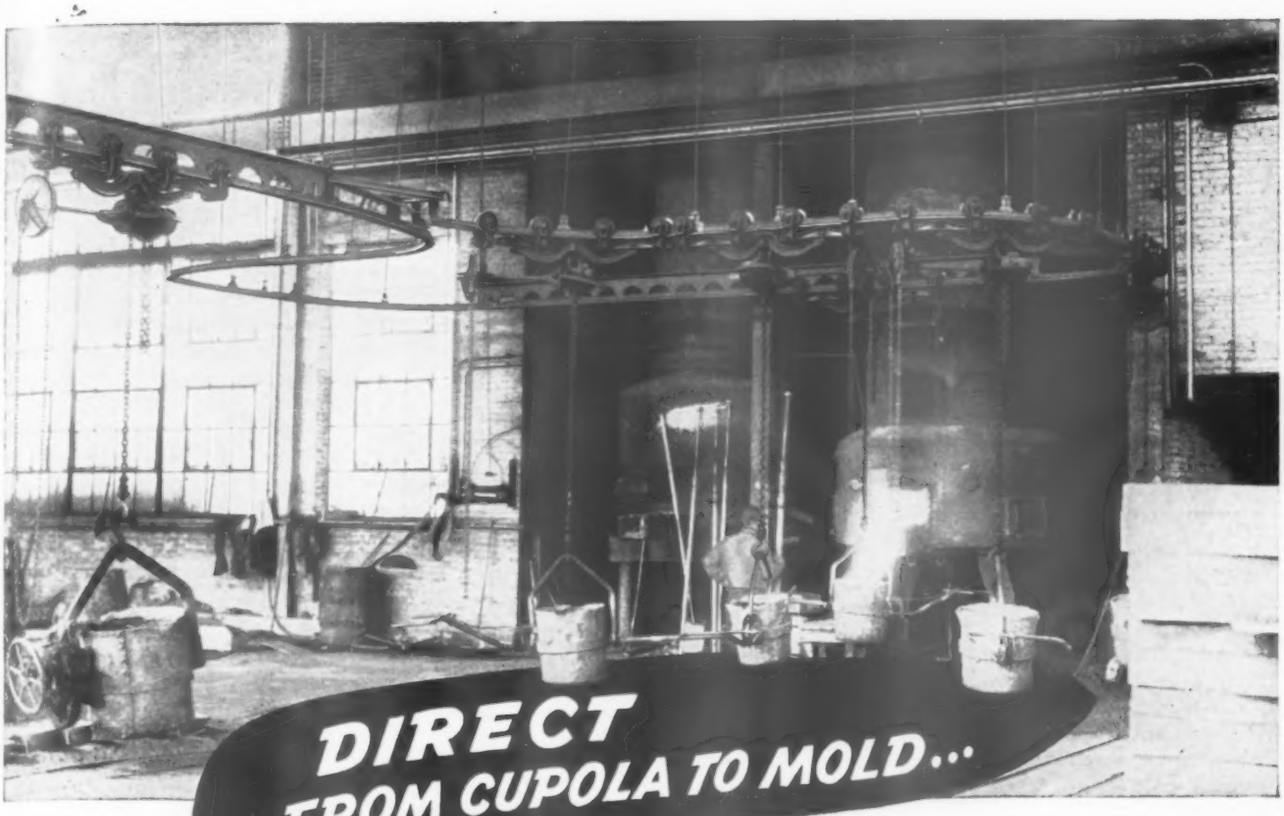
A.—The articles referred to in former correspondence were devoted principally to foundry practice in the use of plaster patterns for tablets and other art work. The brief reference to the finishing and coloring process as applied to the castings were merely incidental However, a book, *Metal Coloring and Finishing*, is available. This covers various processes in comprehensive and intimate detail.

Small Cupola Not Hard To Operate Properly

Q.—We are about to place a small cupola lined to 22 in. diameter into operation and would like to know how much air is required for the usual melting rate. We have a blower with a 7-in. outlet. Do you need another fluxing agent in addition to limestone, and how much stone should be used? What size iron and coke charges should be used?

A.—For a 22-in. cupola capable of melting approximately 3500 lb per hr, the blowing equipment will include a 5 hp motor and fan or blower to deliver about 800 cu ft of air per minute at a pressure of 8 oz. Blast volume is the important feature; pressure being incidental. Usual flux for the cupola is limestone broken into 1-in. size, but other materials may be used. For a 22-in. cupola the coke size is approximately 2 in., and the bed should extend 36 in. above the tops of the tuyeres at the time charging commences. That means after the coke has burned through and settled.

Weight of the coke and iron charges may vary to some extent depending upon the character of the coke and the size of the pieces of pig and scrap. A little experimenting will be necessary to determine that point. A safe beginning would be 30 lb coke and 250 lb iron with 10 lb limestone on each coke charge. If the cupola is in blast over an hour, the slag will have to be removed either continuously or at intervals.



DIRECT FROM CUPOLA TO MOLD...

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Because floor obstructions do not hinder the operation of Cleveland Tramrail, hot metal can be taken directly from cupola to mold without rehandling. As a result travel time is reduced and heat loss of metal is held at a minimum.

The overhead equipment is also advantageous in the handling of molds, transporting finished castings and scrap, changing cupolas, etc.

Get information on Cleveland Tramrail now and study the possibilities of modernizing your foundry methods as hundreds of other foundries have done.

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CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

MEN of Industry

WILLIAM W. COUTTS has become executive vice president of the Gray Iron Founders' Society, succeeding W. W. Rose, who has retired because of ill health. Mr. Coutts recently had been assistant secretary of the National Screw Machine Products Association, where his work took him into all types of management, production and distribution problems. Prior to his association with that organization he was business specialist with the Office of Price Administration, Washington, specializing in products and processes in the metals field. For some time he served the British government in this country in war supplies work. Before the war Mr. Coutts was in the research department of the Standard Statistics Co. for nine years where he was responsible for the direction, planning and conduct of all research activities.

♦ ♦ ♦

E. M. Follman, who for the last six years has been superintendent of the Cleveland Production Co., Cleveland, subsidiary of Griffin Wheel Co., Chicago, has been transferred to Chicago as operating assistant in charge of the labor cost division of the parent company. Mr. Follman has been connected with Griffin Wheel since 1915, when he entered its Pullman plant office. Later he spent eight years in the cupola department of the general office, then alternated as assistant to the superintendent at the Chicago and Pullman works, and for three years was assistant to the superintendent at Chicago. **Lawrence N. Herschelman,** until recently cashier (office manager) of the Cleveland Production Co., has succeeded Mr. Follman as plant superintendent. Mr. Herchelman became associated with Standard Car Wheel Co., Cleveland, in 1924 and was appointed chief clerk two years later when it was absorbed by Griffin Wheel Co. When Cleveland Production Co. was formed in 1930, he was retained as chief clerk, and appointed cashier in 1941.

♦ ♦ ♦

J. W. Wheeler, who formerly was manager of Rolls-Royce permanent mold foundries in England, and more recently advisor to the Reynolds Metals Co.'s casting division, has opened offices in the Worthington building, Springfield, Mass. Mr. Wheeler is operating facilities, in conjunction with consultation work, for the development, design and production of permanent molds. A staff of estimators, trained designers and engineers are engaged in aluminum permanent mold appliances and mobile casting development work. Plans are under way to include Chicago and Cleveland offices.

♦ ♦ ♦

Carl H. Morken has been appointed executive general superintendent, Centrifugal Casting Co. Inc., Bluffton, Ind., in charge of present operations and of the new plant under construction. Mr. Morken had been with the Carondelet Foundry Co., St. Louis, since 1936, where he was sales manager and later general superintendent. In 1942 he was appointed technical consultant on the staff of the chief of ordnance, War Department, where he was concerned with the application of gray iron and malleable iron castings in ordnance materials. Previous associations include foundry engineer and eastern manager of the Detroit Electric Furnace Co., Detroit, from 1930 to 1936; chief metallurgist, the Ohio Brass Co., Mansfield, O., 1925-1930; from 1922 to 1925 he was associated with Berkshire Mining & Development Co., Travertine Products Corp., and as chief chemist and metallurgist for the J. R. Hoven Co., Minneapolis. He is a graduate of the University of Minnesota.

♦ ♦ ♦

Norman A. Erhardt has been appointed general foundry superintendent of the Magnus Bearing Division, National Lead Co., Indianapolis plant, and technical advisor of the St. Louis plant. Mr. Erhardt began his career under Dr. F. M. Beckett of the Electro-Metallurgical Co., Niagara Falls, N. Y., where he assisted in the development of low carbon ferrochrome. He spent 8 years with the foundry, research and development departments of Driver-Harris Co., Harrison, N. J., and for the last 5 years was chief foundry metallurgist at the Philadelphia Navy Yard, where he also taught foundry metallurgy to classes of officers of the Advance Bases Ship Repair units.

♦ ♦ ♦

Marshall H. Jones, after 2 years of active service with the Navy, has been released and has been elected vice president and general manager of Globe Iron Co., Jackson, O. Mr. Jones, a graduate of Taft School, Watertown, Conn., and

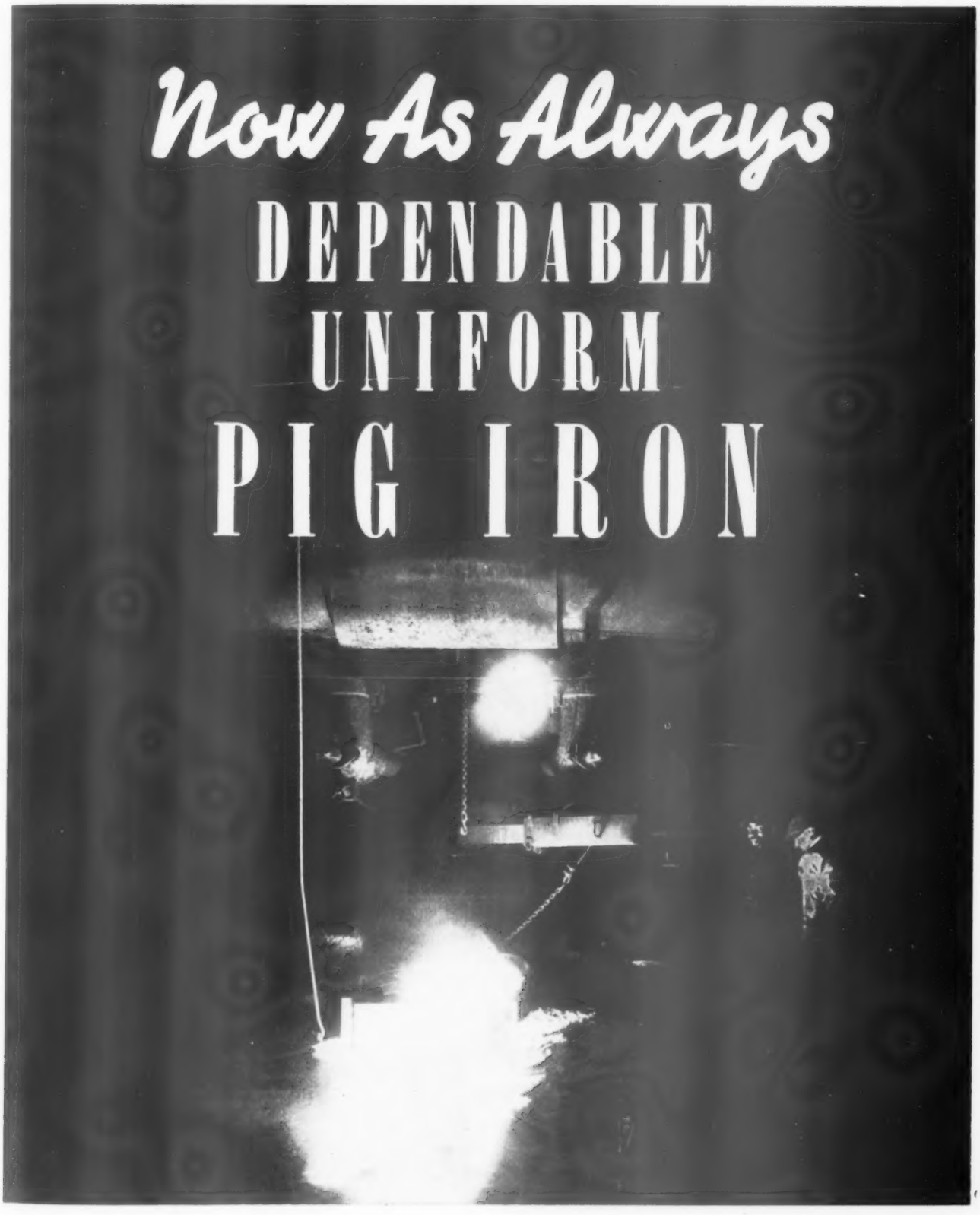
(*Continued on page* 118)

E. M. FOLLMAN

J. W. WHEELER

CARL H. MORKEN

WILLIAM W. COUTTS



WOODWARD IRON COMPANY
WOODWARD, ALABAMA

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

INDEPENDENT SINCE 1883

(*Continued from page* 116)

of Yale University, is the fourth generation of the Jones family engaged in the operation of the company. **Edwin A. Jones** has been retained as its president, and **Charles P. Chapman** has been elected secretary-treasurer. These three officers and the following compose the board of directors: **Mrs. Blanche A. Jones,** Jackson, O., **Thomas H. Jones,** Cleveland; **Morris E. Davis,** Oak Hill, O.; and **James W. Morgan,** Jackson, O.

♦ ♦ ♦

John H. MacDonald, until recently foundry superintendent, the Round Oak Co., Dowagiac, Mich., has been appointed general superintendent of the St. Anne Foundry Co., St. Anne, Ill. Mr. MacDonald entered the foundry industry in 1904 and has had a wide experience. During the war he had charge of the magnesium and gray iron foundries of the Round Oak Co.

♦ ♦ ♦

Richard E. Babcock, until recently supervisor with Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., has been appointed foundry superintendent, Weber Engine Co., Kansas City, Mo. Mr. Babcock was graduated from the university of Michigan and received his apprenticeship training at Campbell, Wyant & Cannon Foundry Co. He was associated with the National Motors Casting Co., South Haven, Mich., at one time.

♦ ♦ ♦

John M. Robb Jr., who was elected to serve this year as chairman of the Philadelphia Chapter of the AFA, is resident manager of Hickman, Williams & Co., that city, with whom he has been associated for about 15 years. Mr. Robb has been active in the Philadelphia Chapter since its establishment in 1935, and served as vice chairman during the last year.

♦ ♦ ♦

John S. Chafee, who served from November, 1942, until October, 1945, with the War Production Board, Washington, most of the time as director of the Tools Division, has joined Saco-Lowell Shops, Boston, and Biddeford, Me., as vice president. Mr. Chafee, a native of Sorrento, Me., was graduated from Brown University. Following service in World War I, he was associated with the Brown & Sharpe Mfg. Co., Providence, R. I., from 1919 to 1942, where he had been vice president for a year, before joining WPB. At the time of his going to Washington he also resigned as president of the National Machine Tool Builders' Association, to which post he had been elected in 1942.

♦ ♦ ♦

Herbert C. Townsend has formed his own business, to be known as the Atchison Pattern Shop, Atchison, Kans. Mr. Townsend entered the foundry industry as a molder, with the Cooper Foundry Co., in 1920. He later worked as molder, machinist and patternmaker with the Atchison Specialty Mfg. Co., until 1942, when he joined Boeing Airplant Co., Wichita, Kans., as a patternmaker, remaining there until last August.

♦ ♦ ♦

Rear Adm. A. H. Van Keuren, USN (Ret.) has been relieved of his command as director of the Naval Research Laboratory, Washington, and has been succeeded by **Comm. Henry A. Schade.** During his 2½-year tenure, Admiral Van Keuren took an active interest in industrial research problems, especially those relating to metallurgy. In recognition of his cooperation with the foundry industry he was awarded an honorary life membership in the American Foundrymen's Association last year by the AFA Board of Awards. Commodore Schade is a native of Minnesota and a graduate of the Naval Academy, Massachusetts Institute of Technology, and the Technische Hochschule in Berlin, where he received his doctorate in naval architecture. He returned from command of the Naval Technical Mission in Europe last fall to take over as director of the laboratory.

♦ ♦ ♦

Verner W. Nylin, formerly a partner in the Manchester Pattern & Model Co., Manchester, Conn., has left that company and has started his own business, to be known as Nylin Patterns, 78 Branford St., Manchester, for the manufacture of wood and metal patterns.

♦ ♦ ♦

Alfred F. Gauron has been appointed field engineer for the New England district of Advance Pressure Castings Inc., Brooklyn, N. Y., with headquarters at Amesbury, Mass. Mr. Gauron is a graduate of Haverhill Trade School and Northeastern University.

♦ ♦ ♦

Harry G. Reddig, until recently associated with Paasch Aluminum Foundry, Moline, Ill., has formed his own company, to be known as Reddig Aluminum Foundry, Rock Island, Ill.

♦ ♦ ♦

John J. Fitzgibbon, after 3½ years of Army service, has returned to the Whitehead Metal Products Co. Inc., New York, as foundry engineer. Mr. Fitzgibbon was metallurgist, R. Hoe & Co., Dunellen, N. J., before his association with Whitehead Metal Products Co.

♦ ♦ ♦

Harry M. Pflager, senior vice president, General Steel Castings Corp., Eddystone, Pa., has retired. Mr. Pflager, who

(*Continued on page* 122)

JOHN H. MacDONALD

RICHARD E. BABCOCK

JOHN M. ROBB JR.

JOHN S. CHAFEE

LOW-COST PALLETIZED HANDLING

Today's indispensable team-mate of mass production is mass handling of materials, finished products and goods in process. And many producers and transporters are finding the answer in the pallet load system, handled by flexible, cost-saving electric trucks, powered with Philco high capacity batteries. One of the greatest new contributions to this system is the battery with 30% longer life—Philco "Thirty". Yes—you can specify Philco "Thirty" in your new electric trucks as well as for replacements. Get the facts today. PHILCO CORPORATION, Storage Battery Division, Trenton 7, New Jersey.

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TYPE OF FOUNDRY	COST SAVINGS	TIME SAVING
GRAY IRON	An analysis of the first five months' operation of a Wheelabrator Special Cabinet and two Wheelabrator Tumblasts at New York Air Brake Co., Watertown, N. Y. showed a savings of 60% or $8,298.74 over previous costs.	Tumbling mills formerly cleaned only 14 truck brake drums in 50 minutes at General Foundry and Mfg. Co., Flint, Michigan. A Wheelabrator Special Cabinet now cleans 120 to 160 in the same time.
STEEL	"Since installing your Wheelabrator, we have saved 75% of our labor in cleaning and due to the cleaner castings have saved the time of our cutters in cutting off gates and risers." Hartford Elec. Steel Corp.	11 to 12 tons of steel castings in the rough *plus* the same tonnage after annealing are cleaned daily in a 48" x 48" Wheelabrator Tumblast at Hart & Crouse Co. Cleaning time averages 10 minutes per load.
MALLEABLE	The Eberhard Mfg. Co. reports that Wheelabrating saves 1½ hours per *load* over the previous tumbling method. Cleaning costs have been reduced to $2.00 per ton for hard iron and to $1.00 per ton for malleable iron.	A quantity of malleable iron caps which had represented 1½ days of work for an airblast cabinet is only enough to keep the Wheelabrator Tumblast busy for 16 minutes at Westinghouse Electric & Mfg. Co.
NON FERROUS	"All of our brass castings are Wheelabrated in 4 hours and iron castings in 3 hours each day. This 7 man-hours of work can be compared with 3 men working 20 hours each day with our former sandblast method."—Dick Brothers, Inc.	Over 60 tons of brass fittings, including gates and risers, are being cleaned daily in a 36" x 42" Wheelabrator Tumblast at Ohio Injector Co., Wadsworth, Ohio. Only 3½ minutes are required to clean each load.

American

FOUNDRY EQUIPMENT CO.

[illegible] S. KILBOURN STREET — MISHAWAKA, INDIANA

Wheelabrate

ME PACE ING VINGS	BETTER CLEANING	FASTER MACHINING LONGER TOOL LIFE
formerly 4 truck 50 min- Foundry nt, Mich- labrator t nav 0 in the	hen the Defiance Ma- ine Works, Inc., in- alled a Wheelabrator ble they were able to minate four tumbling lls, reduce cleaning in nd blast room by 60%, d increase production pacity in 1/3 of former ace.	"We get a much better finish and a much nicer looking casting. Surface defects are brought out so there is no possibility of adding expense to the already defective piece." —Red Jacket Mfg. Co.	In addition to reducing cleaning time and improving the appearance of their work, the Blackmer Pump Co. found the Wheelabrator cleaned their products so thoroughly that tool life on certain jobs had increased 300%.
eel cast- plus the fter an- ed daily Wheelab- Hart & ing time utes per	replacing tumbling lls at a large Cleveland bbing foundry, a heelabrator Plain Ta- e saves $23.60 per day d permits faster ship- nts, thereby reducing rage space and hand- g expense.	"We have been more than satisfied with the improvement in the appearance of our castings. Our customers will no longer accept castings that are not Wheelabrated."—Electrocast Steel Foundry Company.	At a Buffalo plant, a 48" x 42" Wheelabrator Tumblast replaced 10 tumbling barrels, doing a better job in half the time. Before Wheelabrating, only 200 pieces could be machined before dressing the tools. Now they run 1500.
alleable ad rep- ays of ast cab- ugh to abrator for 16 ghouse .	e Marion Malleable on Works, relieved a eatly congested condi- on in the cleaning room installing a 48 x 42" heelabrator Tumblast. ey gained valuable or space by eliminat- g a number of large mbling mills.	Malleable castings are Wheelabrated so thoroughly at Ohio Brass Co., that they can be galvanized directly after cleaning. Castings formerly cleaned in Airblast cabinets required a light pickle before galvanizing.	A prominent Detroit manufacturer (name on request) reports a tool saving of $7000 a year in the brass valve department due to the Wheelabrated sand-free castings they machine.
rass fit- tes and leaned x 42" mblast Co., Only equired d.	The Wheelabrator has abled us to remove ght tumbling mills reby using the floor ace they occupied to arrange our grinding partment, which was adly overcrowd'ed."— e Callender Foundry Mfg. Co., Ltd.	"The cleaning is perfect on all surfaces, including small cored holes that could not possibly be cleaned by any other method. We regret that we did not install the Wheelabrator sooner."— Badger Meter Co.	Customers of the Bronze Alloy Co., report that cutting tools last longer and require less frequent grinding when they machine Wheelabrated castings because they cut metal only — not scale and sand.

RLD'S
ARGEST BUILDERS
F AIRLESS BLAST
EQUIPMENT

(*Continued from page* 118)

was with General Steel and its predecessor, Commonwealth Steel Co., for more than 41 years, will continue as a member of the board of directors of the corporation. He has opened an office in St. Louis, where he will be engaged in various business activities.

♦ ♦ ♦

J. B. Kintner has resigned as vice president of the Union Steel Castings Division of Blaw-Knox Co., Pittsburgh, to establish the J. B. Kintner Co., manufacturers' agency, with offices in the Union Trust building, Pittsburgh. At present the agency's clients include Pittsburgh Steel Foundry Corp., Glassport, Pa., and Fort Pitt Steel Casting Co., McKeesport, Pa. Mr. Kintner was graduated from Purdue University in 1925 and was sales representative with American Rolling Mill Co. until joining Union Steel Casting in a similar capacity in 1936. He was named vice president of the latter in 1944.

♦ ♦ ♦

John O. Logan has been appointed an assistant general manager of sales, the Mathieson Alkali Works Inc., New York. Mr. Logan was graduated from Shurtleff College, Alton, Ill., and joined Mathieson Alkali Works in 1931 as research assistant. He has held positions as technical representative of the New York office, then of the Chicago office and as assistant to the manager of the technical service department, in New York. Until recently he served as western sales manager at Chicago. **Harry P. Smith** has been appointed New York district sales manager, succeeding **J. B. Peake,** who continues as an assistant general manager of sales. Mr. Smith, a graduate of Columbia University, was treasurer, vice president, and president of the George Chemical Co. before joining Mathieson. Both Mr. Logan and Mr. Smith will have headquarters at New York.

♦ ♦ ♦

Frank L. Barton has been made vice president and general manager of the Fulton Foundry & Machine Co. Inc., Cleveland. Mr. Barton has been associated with the company for over 29 years.

♦ ♦ ♦

K. U. Wirtz, formerly assistant secretary, has been made executive vice president, the Electric Furnace Co., Salem, O. Mr. Wirtz, a graduate of Case School of Applied Science, joined the company in 1927 as an erection engineer and later became chief estimator and sales engineer. He was appointed assistant secretary in 1935. **C. L. West,** vice president, has been put in charge of all sales and sales engineering. Mr. West has been associated with the company since 1930. **C. H. Vaughan,** who joined the company as an erection engineer and has served the company in various capacities, has been appointed assistant vice president. He was graduated from the Cincinnati School of Engineering.

♦ ♦ ♦

Melvin L. Manning, formerly assistant chief engineer, has been made chief engineer in charge of electrical and mechanical design and development for the Kuhlman Electric Co., Bay City, Mich. Mr. Manning joined the company last year.

♦ ♦ ♦

K. C. Gardner Jr. has been elected vice president in charge of operations, United Engineering & Foundry Co., Pittsburgh. Mr. Gardner, a son of K. C. Gardner, president and general manager of the company, was formerly assistant to the general manager in charge of operations. **Geoffrey G. Beard,** a vice president, has also been appointed executive assistant to the president. **William Hagel,** formerly vice president in charge of machinery sales, has been made vice president in charge of sales.

♦ ♦ ♦

James MacBeth Jr. has been appointed manager of sales of the newly-established furnace products division of Carnegie-Illinois Steel Corp. The new division will handle the sale of pig iron, ferromanganese, spiegeleisen, and coke. Mr. MacBeth was formerly manager of pig iron sales for Jones & Laughlin Steel Corp., with whom he had been associated for 30 years, prior to his joining the Carnegie-Illinois Steel Corp. sales department in July of last year.

♦ ♦ ♦

R. L. Fowler, chairman of the board of directors, the Florence Stove Co., Gardner, Mass., has been elected president, succeeding **Eugene Holland,** who has resigned as president and a director. Mr. Fowler, who was president of the company from 1931 to April, 1945, will continue as chairman of the board.

♦ ♦ ♦

Benjamin S. Dowd has been elected president and general manager, Vulcan Iron Works, Wilkes-Barre, Pa. **J. F. O'Brien** has been named director of purchases, **George W. Walter,** works manager, **Joseph Lehnert,** production manager, and **C. A. Netter** is in charge of planning.

♦ ♦ ♦

R. H. Cannon has been appointed merchandising engineer for the abrasive division, Norton Co., Worcester, Mass. Mr. Cannon has been associated with the company for 30 years and for the last

(*Concluded on page* 124)

J. B. KINTNER

JOHN O. LOGAN

HARRY P. SMITH

FRANK L. BARTON

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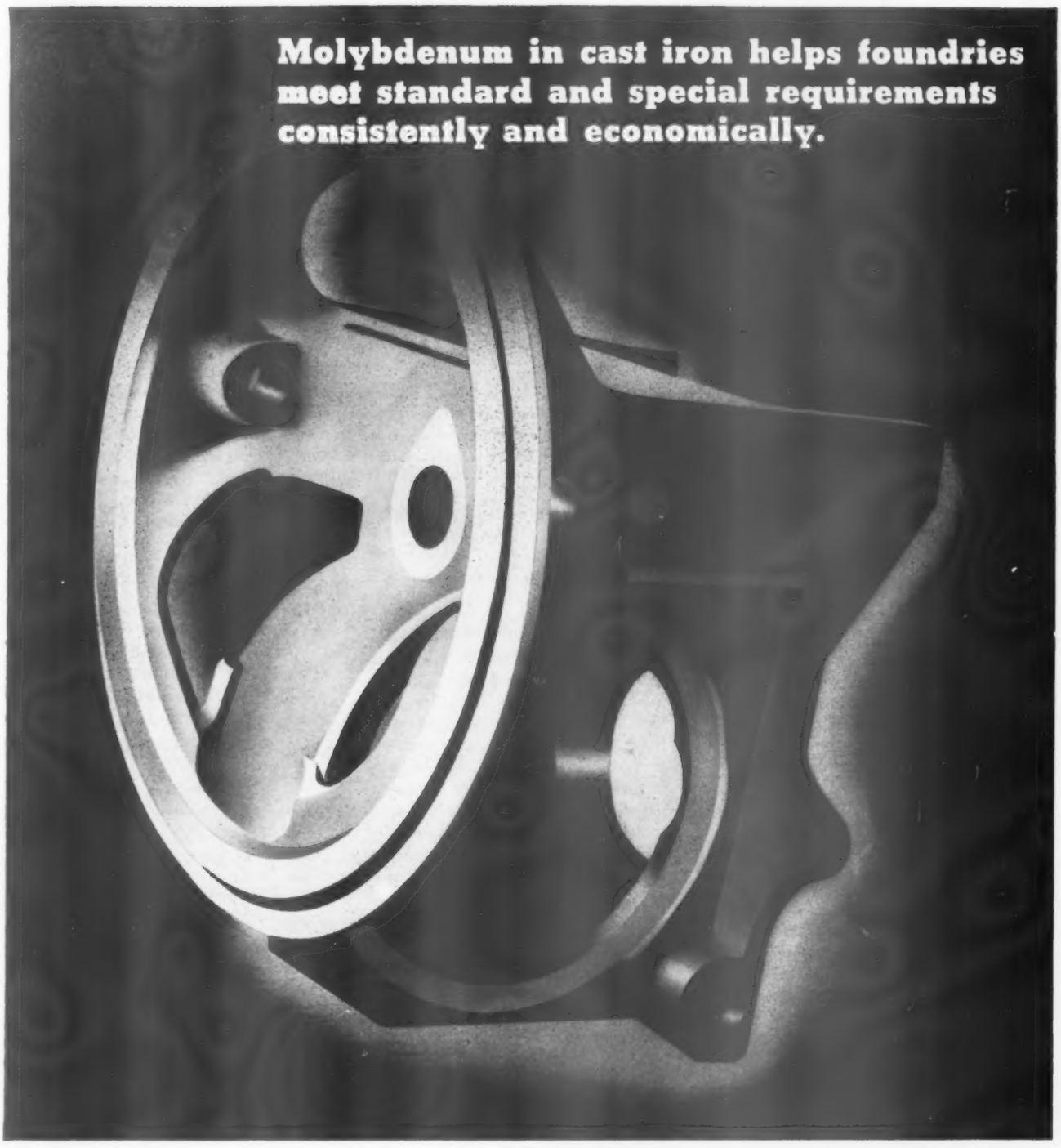

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MOLY

(*Concluded from page* 122)

23 years has been an abrasive engineer in the Ohio area. **W. A. Russell,** recently released by the Navy, succeeds Mr. Cannon as abrasive engineer in that territory. **W. A. McCune Jr.,** also recently released by the Navy, has been appointed an abrasive engineer in the New York-New Jersey area. **N. V. Crabtree,** after four years of service with the Air Forces, has returned to the company as an abrasive engineer in the Michigan territory, with headquarters in Detroit. **W. H. McNeilly Jr.,** and **J. L. Tobey,** following his release by the Navy, will serve as abrasive engineers in the St. Louis and Connecticut areas, respectively.

♦ ♦ ♦

E. Dale Trout, head of the x-ray therapy service and the industrial technical service, General Electric X-Ray Corp., Chicago, has been appointed director of an expanded technical services department, which will add the direction of diagnostic x-ray and physical therapy technical services, to his duties. Mr. Trout, a graduate of Franklin College, joined the educational department of the company in 1928 and was assigned to diagnostic x-ray technical service. In 1935 he began work in x-ray therapy technical service. During the war he assisted in building up technics for industrial x-ray equipment for the company.

♦ ♦ ♦

Dr. George V. Slottman has been placed in charge of the new technical sales division of Air Reduction, New York, which replaces its former applied engineering department. Dr. Slottman was graduated from Massachusetts Institute of Technology and University of Berlin and is a former professor of chemical engineering at M.I.T.. **S. D. Baumer** and **E. V. David,** formerly assistant managers of the applied engineering department, have been appointed assistant managers of the new sales division.

E. D. FLINTERMANN

Who recently was elected president of the Steel Founders' Society of America, as reported in THE FOUNDRY for February.

♦ ♦ ♦

E. E. Eyman has been appointed manager of marine sales, National Malleable & Steel Castings Co., Cleveland, with headquarters in that city. Mr. Eyman joined the company in 1917 and became sales agent at the Cleveland works in 1922. In 1931 he was transferred to the general office in charge of chain sales, and during the war was instrumental in co-ordinating marine chain production, working with government agencies, shipbuilders, marine architects and the company's chain plant at Sharon, Pa.

♦ ♦ ♦

Harvey A. Craig has been appointed Pacific coast manager, Republic Steel Corp., and will supervise the territory served by the Los Angeles office, of which he is manager, and the San Francisco and Seattle offices of the company. Mr. Craig, who joined the Republic organization in 1943, as manager of the Los Angeles sales office, was vice president of Reem Mfg. Co., Richmond, Calif., for many years.

♦ ♦ ♦

Fred J. Tobias has joined Advance Pressure Castings Inc., Brooklyn, N. Y., in charge of production and metallurgy. Mr. Tobias, a native of Czechoslovakia, attended Yale University, and is widely known in the field of die castings as a metallurgical engineer, author and lecturer.

♦ ♦ ♦

Col. Robert I. Randolph, U. S. A. (Ret.), has been appointed deputy district chief of the Chicago Ordnance District, to succeed Brig. Gen. Thomas S. Hammond, who has resigned from government service to devote full time to his work as chairman, Whiting Corp., Harvey, Ill.

♦ ♦ ♦

Carl F. Barchfeld, following 2½ years' service with the Navy, has returned to the Commercial Steel Casting Co., Marion, O., as sales manager. Mr. Barchfeld will be assisted by **Harold W. Rider,** who has returned from 3 years with the Army.

♦ ♦ ♦

Col. John Slezak, called to active Army duty in 1942, has retired from the service and has returned to the Turner Brass Works, Sycamore, Ill., as president. **Col. Joel G. Holmes** succeeds Col. Slezak as chief of the Chicago Ordnance District.

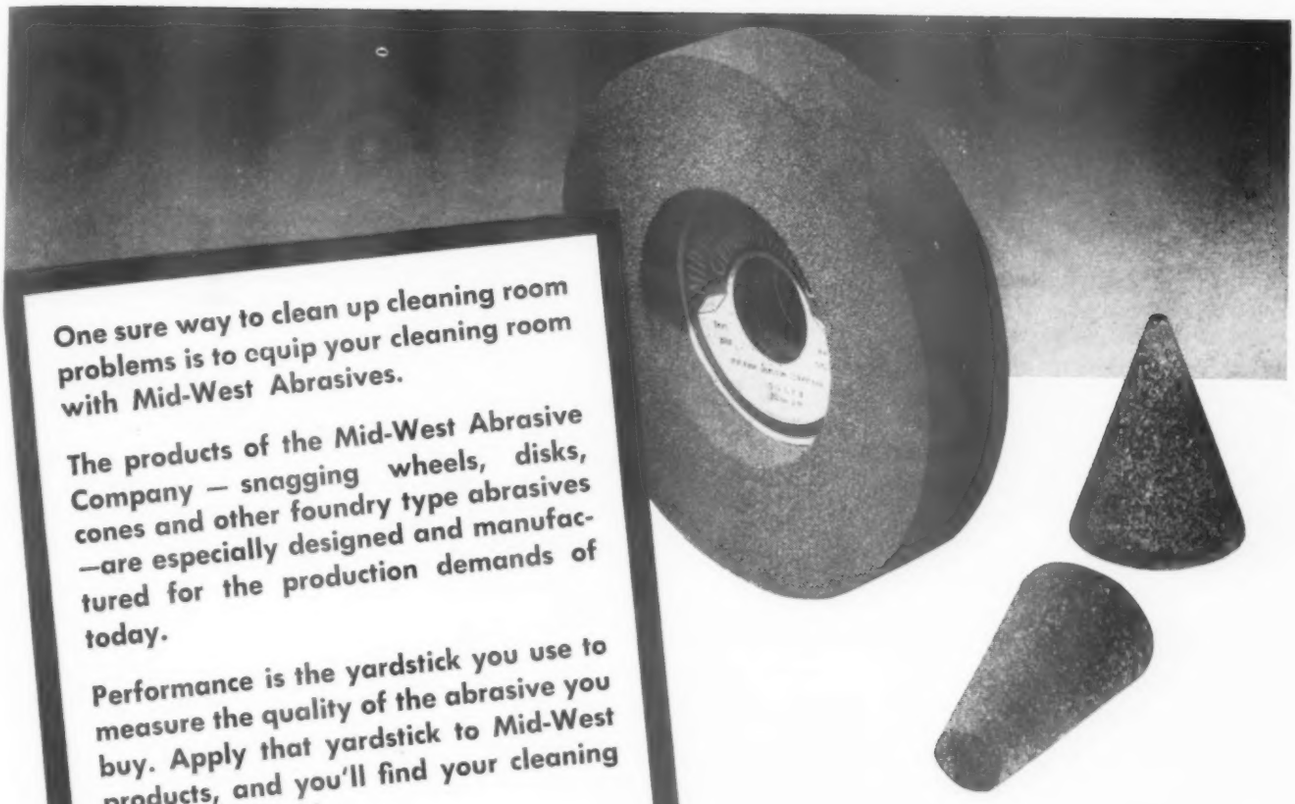
♦ ♦ ♦

Donald Carr, after four and a half years of Army service, has returned to Conco Engineering Works, Mendota, Ill., in charge of hoist and trolley sales.

E. DALE TROUT

DR. GEORGE V. SLOTTMAN

E. E. EYMAN



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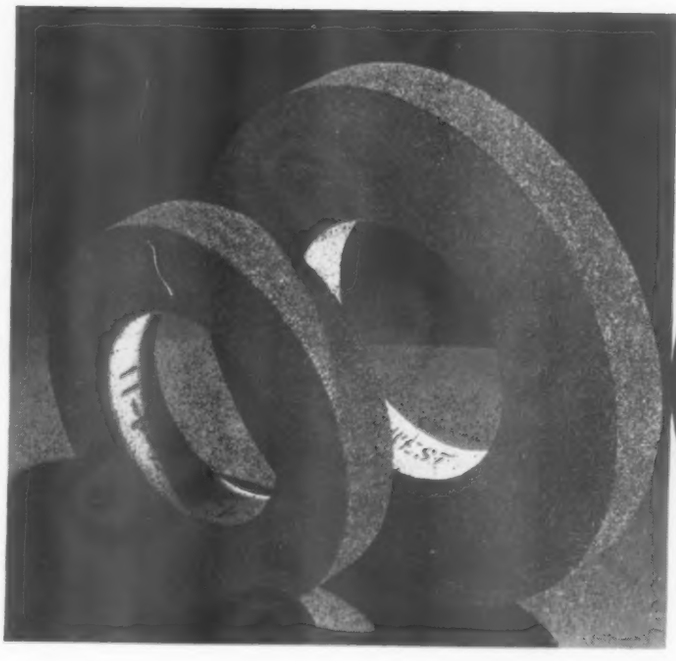

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WISCONSIN CONFERENCE
HAS LARGE ATTENDANCE

By
EDWIN BREMER, PAT DWYER, ERLE F. ROSS
The Foundry

ALFRED W. GREGG
Whiting Corp., Harvey, Ill.

FOUNDRYMEN in the Wisconsin district turned out in full force to participate in the ninth annual Foundry Conference sponsored jointly by the Wisconsin Chapter of the American Foundrymen's Association and the University of Wisconsin. The two-day meeting was held at Hotel Schroeder, Milwaukee, Feb. 7-8, and comprised 22 technical sessions, two general meetings, luncheons and a dinner. Registration was well over 600 while 750 attended the annual dinner.

Luncheon meeting on the first day was addressed by Dr. E. B. Fred, president, University of Wisconsin, who discussed "The University of Wisconsin and Its Relation to Industry." Dr. Fred mentioned the great influx of returning service men desiring further education and the difficulties encountered in finding suitable living quarters for them. He then pointed out the work performed by the university during wartime in aiding industry in solving various problems—work which he said now was converted to peacetime efforts.

Dinner held Thursday night was addressed by Strickland Gillilan, noted political observer, news analyst and lecturer who combined humor and seriousness in a talk on "The Lowdown on Washington High Ups." Luncheon meeting on Friday was addressed by Fred J. Walls, national president, AFA, who spoke on "Future Foundrymen." He stated that if the foundry industry is to survive, it is necessary for every individual connected with it to do his utmost to combat the misinformation relating to the field by stressing its numerous advantages, and carry the message to grammar and high schools. Organized foundry visitations to interest boys should be extended to include parents, school teachers and even ministers of the community, since few of them have any conception of what a foundry is or how it operates.

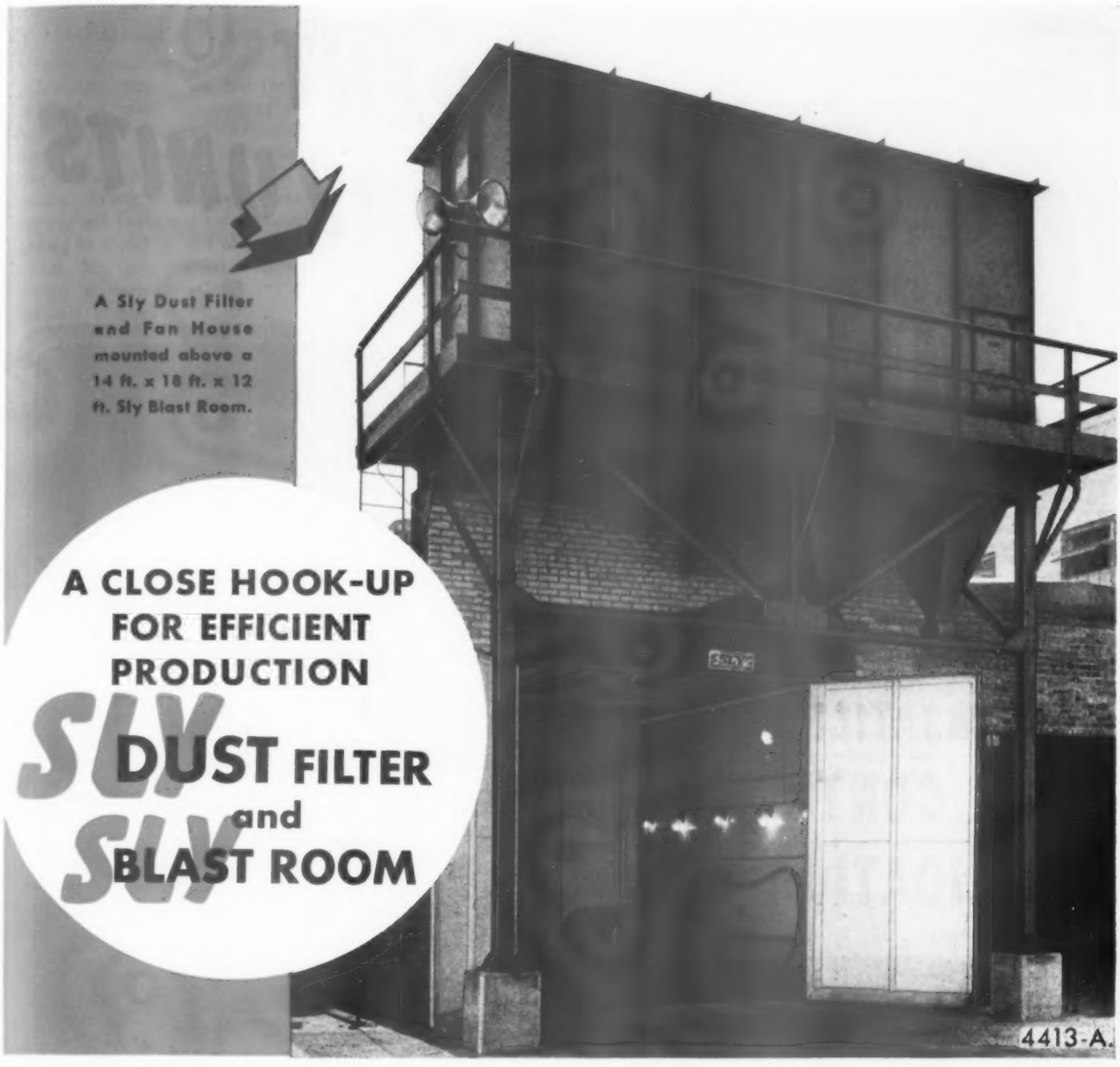
The two-day conference was closed by a general meeting at which Carl O. Thieme, H. Kramer & Co., Chicago, spoke on his trip into Germany and showed an interesting colored motion picture film taken at that time. At the conclusion of his talk he pointed out that due to the huge expenditures of raw materials to produce war materiel, many of our natural resources have reached a low level—so low that this country well may be classified as one of the have-not nations. Hence, attention should be given to stockpiling various materials to guard against any emergency.

Conference was opened formally with an address by Prof. Edwin R. Shorey, department of mining and metallurgy, University of Wisconsin, Madison, Wis., who extended a welcome on behalf of his institution and asserted that the latter's co-sponsorship of the conference with the Wisconsin Chapter was in keeping with the school's objective of serving industry in the state. Prof. Shorey was introduced by Chapter President John Bing, district sales manager, A. P. Green Fire Brick Co., Miwaukee, who also greeted the conference registrants.

This being the first conference conducted since end of the war, and with foundries still in the early reconversion of production to peacetime products, the matter of costs once again assumes commanding importance. It was logical, therefore, that the first general session should be devoted to this subject, since it would be a recurring topic in group sessions to follow. "Costs from the Foundrymen's Viewpoint" was to have been discussed formally by Ralph L. Lee, assistant secretary and treasurer, Grede Foundries Inc., Milwaukee, but with illness preventing, his message was presented by E. R. Roeming, office manager of the same company. A pertinent contribution also was made by J. W. Wolfe, Non-Ferrous Founders' Society, Chicago. H. E. Ladwig, assistant general superintendent, Allis-Chalmers Mfg. Co., Mil-

(*Concluded on page* 129)

Annual dinner during the Wisconsin Foundry Conference attracted a capacity crowd of 750



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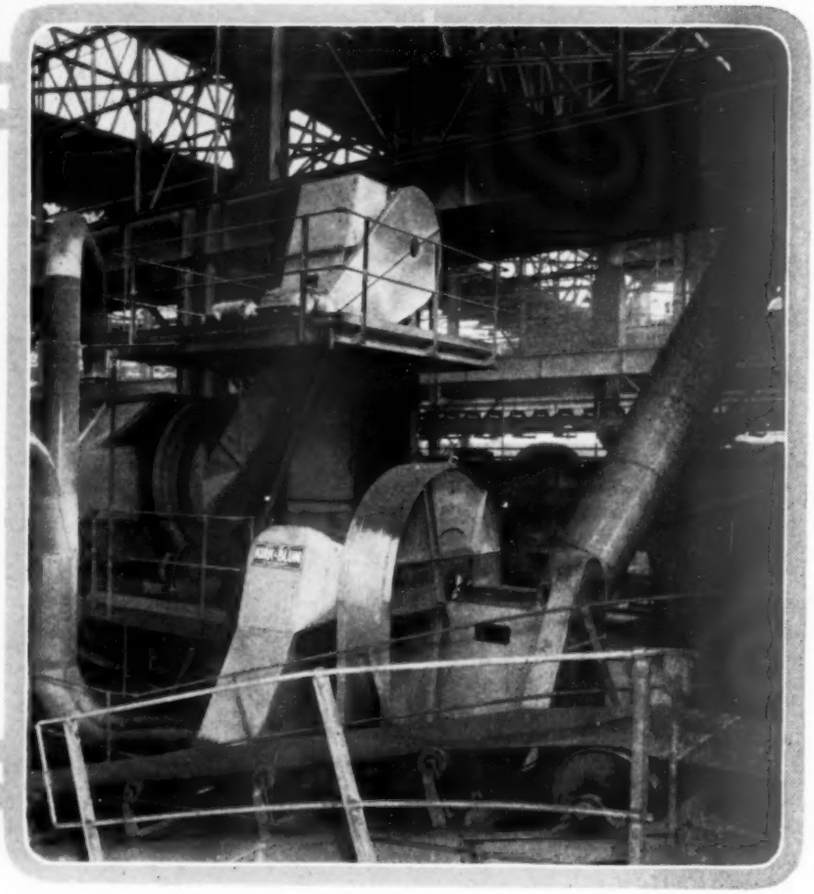

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(*Concluded from page* 126)

waukee, chairmaned the session.

Mr. Lee pointed out that the foundry industry is now experiencing a seller's market, with estimates indicating such may continue from three months to two years, after which will come the buyer's market. When the latter arrives, price cutting will begin and some foundries engaging in it may go out of business. This threat, Mr. Lee warned, makes a cost system a necessity. Good costs are a requisite to good selling.

It is the firm belief of Mr. Lee that pricing should be on a piece basis exclusively. To prove his contention, he submitted figures estimating price versus pound price on a 10-lb gray iron casting. These showed that if actual weight of a casting is always the same as the estimated weight, there is no difference between pound and piece selling prices, but, few foundrymen can "guesstimate" the exact weight of a casting to be made every time. He then demonstrated that if pound basis is used, estimated cost will be too low if casting is under 10 lb, and too high if over 10 lb. He proved further that metal cost makes absolutely no difference between quoting on a per piece or a per pound basis.

Foundries Lack Cost Systems

Mr. Wolfe ventured that only one of five foundries has a cost system, and only one of 20 uses it. Most systems, are too complicated, he declared. Basic costs are identical in all foundries, he continued, a point he admits he cannot prove now, but will in time. What is needed is uniform methods of costing. In conclusion, Mr. Wolfe emphasized that because government wartime controls still are in effect, industry is not working on economics today, but on tax laws.

Four technical sessions were held during the conference which related to nonferrous founding. The first was concerned with nonferrous centrifugal casting practice which was discussed by Nathan Janco, Centrifugal Casting Machine Corp., Tulsa, Okla. Chairmen of the meeting were John Putchinski, Allis-Chalmers Mfg. Co., Milwaukee and John Weaver, Waukesha Foundry Co., Waukesha, Wis. Mr. Janco stated that molds made of sand, iron or steel could be employed. Thin castings usually are poured at the higher temperatures and higher rates of speed for rotation. Heavy castings can be poured at lower temperatures because the greater quantity of metal carries more heat, and in the case of sand molds the metal loses the heat rapidly at first and then much more slowly due to the low heat conductivity of sand.

Speed of rotation of the mold depends upon a number of factors, including mold material such as sand or metal, and the diameter of the casting. Low mold speeds or low temperature of the metal may cause "raining" action of metal in the mold which means that the metal is not held to the mold wall, but drops or rolls back. Second session was devoted to a discussion on blowing of small cores and a demonstration of procedure with a cartridge type machine by J. Howard Ware, Redford Iron & Equipment Co., Detroit. Chairmen were Henry Seeboth, Milwaukee Bronze Casting Co., and John Wiltzius, Nordberg Mfg. Co.

Incipient shrinkage commanded bulk of attention at the third nonferrous session, and in the capable hands of W. B. George, metallurgist and foundry engineer, R. Lavin & Sons Inc., Chicago, the discussion was as interesting as it was informative. John W. Weaver, foundry engineer, Waukesha Foundry Co., Waukesha, Wis., presided. Mr. George stated that incipient shrinkage has five divisions — liquid, dendrite, volume, lineal and diameter—and along with them must be considered two other factors, namely, direction of solidification, and rate of solidification.

To explain what happens when metal solidifies, he resorted to the simple example of what happens when water in a pan freezes. As the liquid goes into a solid, the volume shrinks, and as the outside of the mass becomes solid first, the water remaining in the center is sucked away to assist crystal formation. This leaves voids or holes in the center which are analagous to the dendritic condition in the center of a mass of metal that solidifies or freezes slowly. Mr. George confined himself principally to the tin bronzes which solidify in a matter of seconds.

It is essential, he said, that these alloys freeze rapidly, for tensile strength declines inversely with solidification time. This is demonstrated by a stepped test bar having several thicknesses of metal. The thinnest bar, and therefore the first to cool because of the smaller mass, will have the highest tensile strength. To get high tensiles in some tin bronze castings, it is often necessary to employ chills to speed solidification. In contrast, in manganese bronze, which has equiaxial crystals, rate of cooling makes no difference. Shrinkage is uniform in all directions and no sucking of metal occurs in the center of the mass. In solidification, tin bronze will suck metal 6 in. uphill, and the suction is so powerful that pressure created from large risers is of no avail.

Dwelling briefly on manganese bronze, Mr. George described a practical and tried method for breaking off risers. This metal has a brittle range where it will snap readily. Known as the pink range, it lies in color between the red and yellow shown on the surface as the casting cools. This brittle range varies with the alloy—on high tensile material it lies between 600 and 1000 F. on the casting, and on 60,000-lb tensile alloy it shortens up considerably and is closer to 700 to 750 F. Should the casting become cold, it can be heated until the brittle range, pink in color, shows up on the rising side, and again the riser may be snapped off.

In actual practice, it has been found that manganese bronze will feed through a restricted opening in a thin core, almost as well as if the full diameter of the riser was applied. This fact, combined with the fact that manganese bronze has a brittle range, enables the foundryman to snap off risers with a hammer. According to Mr. George, enormous savings have resulted in clean-up for those able to adopt the process. Breaking off heads has had a good try-out, and many hundreds of tons have been cast. Mr. George knows of no patents, but assumes no responsibility for passing on the information.

Detect Flaw in Bronze

Fourth and concluding session under the chairmanship of Marvin Nevins, Ampco Metals Inc., and Henry Seeboth, Milwaukee Bronze Casting Co., comprised a discussion on "Radiographic Detection of Flaws in Tin Bronze Castings," by Dr. Blake Loring and William Baer, Naval Research Laboratory, Anacostia Station, Washington, which pointed out the need for some type of radiographic standards for bronzes similar to those available for aluminum and steel castings, and discussed investigatory work conducted by the laboratory along that line.

The work as yet is not completed, but that done so far was described by the speakers. About 100 bronze plates 8 x 6 x 1 in. were cast under carefully controlled conditions to develop a series of graded defects such as distributed shrinkage, hot tears, slag and sand inclusions, and gas porosity. Alloy used was 88 per cent Cu, 8 per cent Sn and 4 per cent Zn. Selected plates were investigated in great detail through radiographs, micro-radiographs and fractures, and some 38 views of those were shown on the screen.

(*To be concluded next issue*)

THE FOUNDRY Index Ready

The index to Volume 73 of THE FOUNDRY, covering the 12 issues of 1945, is ready for distribution. Copies are available to subscribers on request.

Around DETROIT

BY A. H. ALLEN
Detroit Editor, The Foundry

Foundry schedules hit by steel strike. . . . Heat-producing inserts improve feeding of castings, reduce metal required in gates, risers. . . . Price ceilings still squeeze

COMING on top of a critical supply situation in basic raw materials—pig iron, scrap and coke—the steel strike threw another crippling punch at foundry operations in the Detroit area. Even though blast furnaces and mills may have resumed by the time this appears in print it is doubtful if there will have been time to make up the materials deficit so that castings production can be moved back to schedule. Many foundry operators pursued the policy of taking a squint at pig iron inventories when the steel strike was called, adding on the tonnage of iron in transit to their account and then calculating what rate of production would permit stretching out these supplies to about March 1. In one case at least it was decided to scale back production 50 per cent.

Shipments of pig iron from a couple of merchant furnace interests not on strike went forward, but they were considerably short of overall foundry demands. In addition, no relief has developed on the score of scrap, and coke supplies remained touch and go.

Strike Stops Expansion Program

Imminence of a settlement of the General Motors strike was a further complicating factor, since indications pointed to early resumption of materials intake at the Chevrolet, Buick, Pontiac, Saginaw Malleable and Cadillac foundry divisions, although the latter may meet considerable delay because of the fact that a new construction program there has been completely stymied by the strike. Expansion programs at Pontiac and Chevrolet Gray Iron also have been blacked out, but this will not interfere with regular production when once started.

Long delays in getting 1946 model production under way, not only at General Motors divisions, but at nearly every other builder's plants as well, have given rise to guesses that the introduction of 1947 models this fall may be dispensed with and 1946 models continued right through the year, with occasional minor changes being made as they come along and no strictly new models until some time next year. This may be a good hunch, but it does not add up in the light of planning and engineering work accomplished thus far.

Most car builders last year contemplated bringing out their 1947 models this fall, Ford for example having announced it would have 1947 assemblies started in September. Designers and stylists have been at work evolving new body concepts, many of which have progressed into the early tooling stages. It is not likely all this work will be called off, even though the 1946 model production will not reach original anticipations. Rather it would appear that some delay will develop, and the 1947 models could make their appearance, say, in December instead of September. Meanwhile, a large chunk of the original 1946 program would be sliced off, not to be reinstated. The latter, in fact, already has happened in the case of Packard, which trimmed 44,000 from an original outlay of 94,000. Thus, according to the present outlook, Packard will build 50,000 of the 1946 models and then shift over to the 1947s.

• • •

AN UNUSUAL and seemingly promising development in the field of castings production, one which will be announced publicly in the near future and is scheduled for display at the forthcoming AFA exhibit in Cleveland, May 6-10, is a substance called by its originators a "thermatomic feeding material." As sketchily described to this correspondent, it is a mixture of thermit powder (iron and aluminum) in a suitable refractory binder which, by the addition of 4 per cent water, may be formed into any desired shape and baked solid in a conventional type of core oven. Such shapes—an annular ring for example—are inserted in the pouring gates of molds or at other positions where they will come in contact with molten metal entering the mold, and by contact with molten metal start to react and glow with near-white heat, serving to heat up metal entering the mold and improve the feeding of the casting. The reaction is not violent, as in the case of the normal thermit reaction, being slowed down by the admixture of refractory binder. Thus the intense heat of the "thermatomic" insert (3400 degrees) continues over a period of seconds or minutes, constantly reinforcing the temperature of metal in heads, gates, risers, etc.

Experiments are in progress at several plants locally, using the inserts on various types of castings, including steel, gray iron, bronze and other metals, and in many cases the results are described as almost sensational from the standpoint of reducing the volume of metal required in gates and risers and of eliminating pipe and seams in the cast metal adjacent to heads. In one case a normal 5-in. diameter head was reduced to a cone shape tapering to 1-in. diameter at the casting, a ring of the thermit material being inserted in the mold at the base of the cone. Cross sectioning of the casting after pouring and cooling showed complete freedom from porosity under the head, which, of course, was only a fraction of the volume of the metal normally used in production of the same casting.

Keeps the Metal Hot

Cost of the material reportedly has been set tentatively at 40 cents a pound, which probably could be easily offset in savings on return scrap in the case of many castings. Once burned, the thermit inserts reduce to a crumbly slag which is easily broken away. From all indications, much more will be heard of this novel development.

As a sidelight, one foundry engineer hearing of the idea noted a similar setup was at one time reported in British technical circles. It involved the use of a thermit material in blind risers to generate sufficient gas pressure on the molten metal to aid a dense solidification.

On the subject of new procedures and techniques another interesting one has come to light, involving the pumping of molten magnesium and aluminum through pipelines to permanent mold casting stations. Dow Chemical Co. is using a pumping system for molten magnesium metal, while a Cleveland company is understood to have developed a similar setup for handling molten aluminum used in casting pistons in permanent molds.

Not much has been disclosed as yet regarding the types of pumps or pipelines used in the systems. Ferrous metal probably would be suitable in the case of piping for magnesium where iron pickup

(*Concluded on page* 132)

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(*Concluded on page* 130)

is not too serious a problem, but for aluminum such alloying danger is distinctly undesirable. There would probably be danger also in nickel and nickel alloy lines. A further apparent necessity would be some form of insulation to prevent excessive temperature drop between the point where metal is introduced into the lines and the discharge stations.

• • •

PIN-POINTING a problem which scores of foundries are facing with slight prospects of any early solution, Henry Ford II, president of Ford Motor Co., recently told a San Francisco audience, "A foundry which has supplied us for many years with gray iron castings gave us our patterns back not long ago. During 1945 they lost $330,000 because the cost to them of producing the castings we needed was above the price at which they were allowed (by OPA) to sell us castings. They told us they were sorry but they couldn't afford that kind of losses."

Whether to give up production in the face of ruinous OPA price ceilings, to fight them by carrying the case to the public, or to continue on in the grim determination that some day things will be better are decisions which nearly all manufacturers these days must make. Some obviously already have taken the first course; few are adopting the second; most are gritting their teeth and following the third.

The sad part of the whole situation is that while OPA professes to be an agency which is holding the line against inflation, actually it is turning out to be a production and profit control bureau. Consider this case, also mentioned by Mr. Ford: A supplier had been making thousands of small but vital truck parts for Ford, priced at 50 cents each. His material prices had gone up so much after V-J Day he asked OPA for permission to charge 61 cents. OPA said "no"; it could go as high as 54 cents, but the supplier could not operate at that figure so discontinued production. Ford immediately went shopping for new source and found two which are now supplying the part in question—one at 82 cents and one at 84 cents—with full OPA approval because these companies had never produced the part previously. Is this holding the line against inflation? Ford is paying 68 per cent higher prices than before the war, and 38 per cent higher than would have been possible with no price ceiling to restrain the original supplier.

• • •

A COMPREHENSIVE analysis of dust and fume control problems in the foundry will be a feature of a foundrymen's meeting at Detroit on March 21 and will stress the practical considerations involved and methods for their achievement. It is the consensus of many that far too little study is given to this question by engineers and architects called upon to do layouts of new foundry installations, and that determined efforts must be made to bring understanding of the importance of dust control not alone to foundry operators but to those whose job it is to design and plan production facilities as well.

NEW ENGLAND GROUPS

Plan Regional Conference

SIXTH New England Regional Foundry Conference will be held at the Massachusetts Institute of Technology, Cambridge, Mass., March 29-30. This will mark a resumption of the regional meetings which were interrupted by the war, the last conference having been held in 1941.

Joint sponsors of the meeting are the New England Foundrymen's Association, American Foundrymen's Association, Massachusetts Institute of Technology, Boston Chapter of the Non-Ferrous Founders' Society, Connecticut Foundrymen's Association and the Connecticut Non-Ferrous Foundrymen's Association. Co-operating organizations are: American Society for Metals, American Society of Mechanical Engineers, American Institute of Mining and Metallurgical Engineers, American Welding Society and American Industrial Radium and X-Ray Society.

Purpose of the conference is to bring together engineers, metallurgists and foundrymen for an open discussion of the problems encountered in the design and production of castings. Technical sessions have been planned with particular thought to provision for free discussion of the subjects to be presented. Walter M. Saunders Jr., 184 Whittier Ave., Providence 9, R. I., is chairman of the conference.

On Saturday night, March 30, immediately following the last session, the vendors, numbering approximately 100, will be hosts at a smoker for the attending foundrymen. The smoker, to be held at the Parker House, Boston, has the following committee: Ray Hunter, chairman; Harry Impey, treasurer; Hugh Johnston; Bill Slater and Frank Kumer.

The program follows:

Friday, March 29

9:30- 9:45—Opening of conference.
9:45-10:45—Technical session, R. F. Harrington, chairman. "Repair Welding of Castings," by Vincent T. Malcolm, Chapman Valve Mfg. Co.
10:45-11:30—"Cleaning of Castings," by Fred Mosely, Whitehead Bros. Co.
11:30-12:15—"Radiographic Inspection of Castings," by Dr. John T. Norton, M.I.T.
12:15- 2:00—Lunch.
2:00- 2:45—Lumen S. Brown Lecture.
2:45- 4:00—Technical session, Dr. R. S. Williams, chairman. "Modernization of the Foundry," by Lester B. Knight, Lester B. Knight Associates.
4:00- 5:15—"Melting of Bronze," by W. B. George, R. Lavin & Sons Inc.
6:00—Conference dinner. Speakers Frank G. Steinebach, editor of THE FOUNDRY, and Dr. Karl T. Compton, president of M.I.T.

Saturday, March 30

9:30-10:45—Technical session, T. R. Walker, chairman. "Foundry Sands," by Charles Schureman, F. E. Schundler & Co.
10:45-12:00—"Melting Cast Iron," by Donald J. Reese, International Nickel Co.
12:00- 2:00—Lunch.
2:00- 3:30—Technical session, A. S. Wright, chairman. "Casting Defects," by W. A. Hambly, Allis-Chalmers Mfg. Co.
3:30- 5:00—"Gating and Risering," by Howard Taylor, M.I.T.

Pettibone Acquires Beardsley & Piper

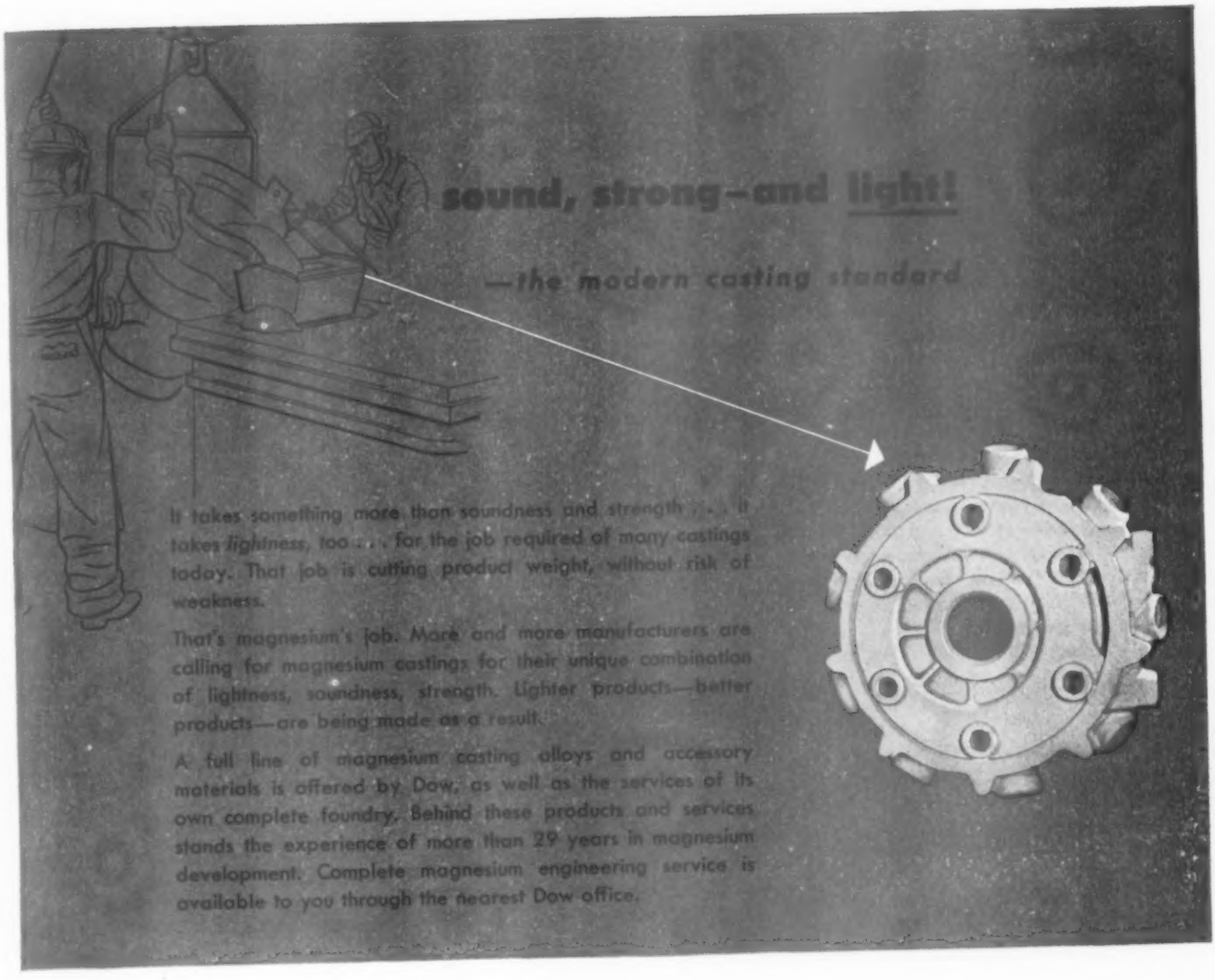
Pettibone Mulliken Corp., Chicago, has acquired the Beardsley & Piper Co., foundry equipment manufacturer of that city, which it will operate as a wholly-owned subsidiary under its present name. New officers of the Beardsley & Piper Co. are E. J. Seifert, president and treasurer, Chester V. Nass, vice president, and Edmond S. Cummings Jr., secretary. These officers also comprise the board of directors.

Putting Equipment To Work

(*Concluded from page* 99)

or looks after inspection.

This is not intended as a castigation of industry, but is a recounting of experiences which are all too prevalent because of lack of enthusiasm on the part of management for the possibilities of maintaining not daily but constant cupola control. It is truly remarkable the improvement which can be shown by the assignment of a man to such a task, and it is even more remarkable how much premium can be secured for castings which do not deviate materially from standards agreed upon. All of the tools necessary for such control are available. What we need are men to operate them and to be unhampered by other duties which detract from their principal object of producing more dependable work.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STUDIES OF GASES IN BRONZE

(*Continued from page* 89)

used a CO atmosphere and obtained results nearly equal to those with vacuum or nitrogen, but Bolton and Weigand[15] are emphatic in their belief that carbon monoxide in the furnace atmosphere causes severe porosity in bronze. Pearson and Baker, however, do not believe that carbon monoxide of itself causes porosity but allows more hydrogen to be present in the furnace atmosphere.

The work of Floe and Chipman[7] in 1942 indicated that there is some slight solubility of carbon in copper. That this is so was confirmed by Bever and Floe in 1945[19]. They found that the solubility of carbon in molton copper varied from about 0.0001 per cent at 1100 C to 0.003 per cent at 1700 C. Bever and Floe stated that "carbon dissolved even in these very small amounts can be one of the major causes of gas porosity in copper and copper-base alloys. For example, at 1200 C the equilibrium solubility in 100 g of copper is sufficient to form about 0.25 cc (STP) of carbon monoxide or dioxide if all the carbon becomes oxidized. This is equivalent to more than one cubic centimeter at the freezing point of copper." They also point out that while this is a smaller gas volume than the hydrogen solubility at the same temperature, the carbon gases are practically insoluble and therefore are evolved as fast as they are formed by oxidation of the dissolved carbon. They also found that the carbon solubility in tin bronzes was of much the same magnitude as in pure copper. Smith[20] also believes that carbon-oxygen reactions may be a primary source of porosity in bronzes.

Many Opinions Offered

Sulphur dioxide has been reported as a minor source of porosity in copper and bronze by Hesse[17], Arnott[21], Strauss[22], and Rowe[23]. Schwietzke[24], however, suggested that the reaction of the gas with copper or tin was irreversible. Pearson and Baker[9] report that sulphur dioxide causes a peculiar form of spherical porosity in bronze associated with the eutectoid, but that it has small effect of mechanical properties.

The present consensus is that hydrogen is the chief source of gas porosity in bronze. It may be remembered that Sieverts[1] and others found that hydrogen was less soluble in bronze than in copper, but Bailey[25], Allen[26], Daniels[13] Claus and Bauer[25], Hesse[17], Gardner and coworkers[27], and Pearson and Baker[9] have all presented evidence that hydrogen is a principal source of unsoundness in bronze.

It is probably more correct to mention hydrogen and oxygen as the chief causes of porosity, since many believe that it is the water vapor in the furnace atmosphere, or a steam reaction, that causes unsoundness. This, however, will be discussed in the following section.

Mechanism of Porosity Formation—By far the largest part of the work on unsoundness in bronze castings has been done in the attempt to explain the mechanism of porosity, or to find the proper methods of eliminating or minimizing this unsoundness. The present-day conception of how gas porosity occurs is the result of the work of a number of investigators. Theory of the mechanism is still in the formative stage so that there is ample room for new contributions. Enough is known, however, to explain in general terms what is observed in bronze castings. The biggest void in the literature is in the realm of physical chemistry of bronze melting reactions.

The first step toward building up an acceptable theory came with the work of Comstock[28] in 1919. He pointed out that it was not oxide films at the grain boundaries that were the cause of porosity, but rather fissures between the grains. Woyski and Boeck[29], and Bolton and Weigand[15] held this same belief and offered data to prove it, and also ascribed porosity to the combined effects of shrinkage and gas evolution. Bolton and Weigand introduced the term "incipient shrinkage" to describe the intercrystalline fissures they thought responsible for unsoundness. Dews[30], in 1929, Scheur[31], in 1935, both believed that porosity was caused by solidification shrinkage alone, ". . . since the last liquid portions of the casting contract on freezing within an intricate network of primary dendrites which hinder the feeding necessary to compensate for such contraction. The force of this argument is apparent when it is remembered that the solidification contraction of the alloys is of the order of 5 to 7 per cent by volume, while the freezing ranges of the commonly used alloys are of the order of 200 to 300 C°."

Allen[32], in 1930, proposed his theory of "steam unsoundness" after he had shown that hydrogen and oxygen can coexist in molten copper and recombine upon solidification. Daniels[13] in the same year published a paper wherein he came to a similar conclusion for tin bronzes. Daniels' paper was criticized at the time for presenting incomplete proof of his contentions, but his work was substantiated at a later date. Allen[26], in 1932, expressed the view that hydrogen, resulting from the reaction between the steam in the atmosphere and the molten metal, dissolves in the metal. He pointed out also that the blowhole type of defect rarely causes leaks, while the interdendritic fissure adversely affects pressure tightness.

Allen and Hewitt[33], in 1933, gave experimental proof of the equilibrium between steam and the liquid metal and showed that in copper this reaction caused porosity. In 1935 Allen and Puddephat[11] studied porosity in tin bronzes with respect to the variations in the copper content and found that the distribution of porosity was influenced principally by the flow of heat during solidification. There was a close relationship between the porosity and segregation in the ingots.

One of the first to suggest that hydrogen reacted with oxides present in the metal to form steam, which in turn made the metal porous, was Brownsdon[34], in 1935, who said, ". . . As regards the evolved gases, some may result from liberation of dissolved or occluded gases present in the solid metal, whilst others, generally the larger volume, arise from reactions, even between solid constituents, which only take place when the metal is melted or heated. The volume and composition of the gases obtained by heating or melting under reduced pressures, cannot, therefore, be taken as indicating the quantity, or even existence in the solid metal."

Hydrogen Present in Metal

In the discussion of the Brownsdon paper it was brought out by Smithells[35] that hydrogen is present in the metal in the atomic state, and as such, is a strong reducing agent. When the alloy saturated with atomic hydrogen solidifies the gas may react with any oxides present to form steam which cannot diffuse away. This causes unsoundness by the same mechanism as hydrogen embrittlement of copper. When no oxides are present the hydrogen may diffuse away, leaving sound, dense metal.

Importance of water vapor in contributing to unsoundness was emphasized by Hanson[36] who said, " . . .If metals could be prevented from coming into contact with water in any form during their history most of the defects due to gases would disappear." Water vapor is dissociated by molten metal with hydrogen as one of the reaction products. In his lecture to the AIME in 1935, Edwards[37] pointed out that hydrogen is not present in the molecular state in liquid copper, and since no hydrides are evident, the gas must be dissolved. He stated that if anything restricted the free liberation of the gas while a metal was solidifying and caused an increase in internal pressure, the solubility of the gas would be increased. This, he believed, was probably the explanation for sound castings when copper or bronze was cast in chill molds.

(*Continued on page* 136)

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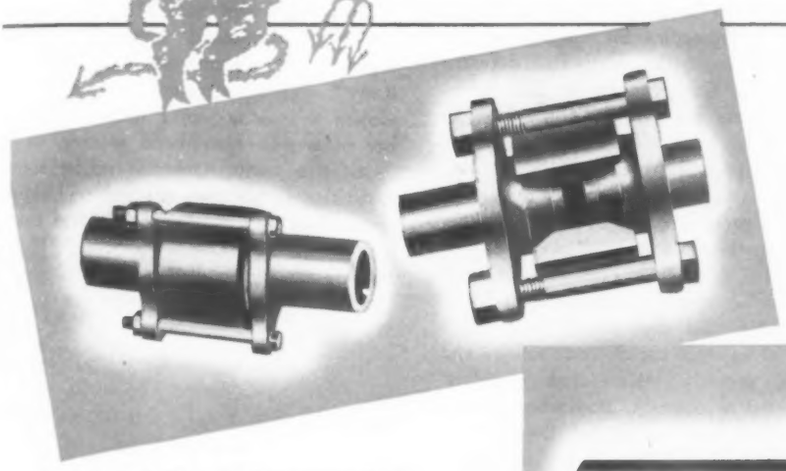

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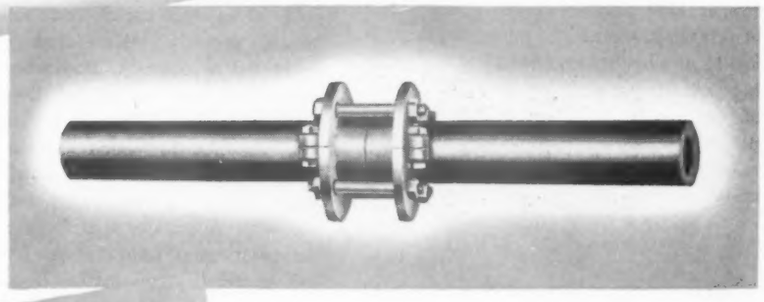

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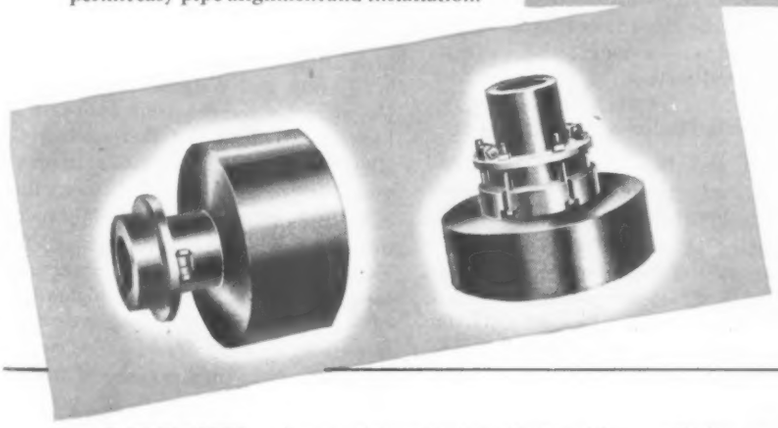

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(*Continued from page* 134)

Smithells[35] proposed that metals be melted in a hydrogen atmosphere to produce sound, thoroughly deoxidized castings. He based his viewpoint on successful commercial practice and the fact that atomic hydrogen is a highly efficient deoxidizer. Metal melted under hydrogen and properly phosphorized showed relatively good behavior according to Kroll, Ball, and Anderson[38]. A number of papers have been published wherein porosity in tin bronzes is said to be caused by the long solidification range, and thus, inadequate feeding, as well as the evolution of dissolved gases. Howard[39], Bailey[40], Hopwood[41], and Longden[42], all wrote more or less descriptive articles expressing this viewpoint, especially as it affected foundry practice.

In 1939 Bailey[39] produced evidence of the unsoundness in tin bronzes caused by hydrogen. He believed that the solubility of hydrogen was reduced by the presence of oxygen and vice versa, and that an equilibrium existed between the two gases. Bailey also said that. " . . .in copper base alloys oxygen of the order of 0.0001 per cent by weight would suffice to produce steam enough at the melting point to cause 5 per cent by volume of cavities if sufficient hydrogen were present." Hydrogen is produced by the reaction between steam and molten metal:

$$H_2O + Cu \quad 2H + CuO$$

Tin causes intercrystalline shrinkage in bronzes according to work done at the Naval Research Laboratory[37], and hydrogen, water vapor and an incorrect pouring temperature will cause porosity in "G" bronze. This was the first reported attempt to directly correlate pressure tightness with the factors thought responsible for unsoundness, but the measurements were inconclusive. Gardner, Saeger and Krynitsky[37] correlated unsoundness caused by hydrogen with pressure tightness in red brass. They also found that melting in an atmosphere of CH_4 gave unsound metal. The effect of shrinkage and gas porosity on the pressure tightness and mechanical properties of bronze sand castings was investigated thoroughly by Baker, Child, and Glaisher[43], who concluded that in some types of bronze a moderate gas content will improve pressure tightness by distributing shrinkage porosity more uniformly throughout poorly fed castings. They also considered effects of gases on various bronzes and decided that the conventional "G" bronze was least satisfactory for intricate castings required to be pressure tight.

One of the better papers on gas porosity in bronzes was published by Pearson and Baker[9] in 1941. In addition to reviewing critically the previous work in the field, they gave experimental proof of the deleterious effect of hydrogen and water vapor in tin bronzes. They found that small amounts of hydrogen improved mechanical properties of chill cast alloys. Large amounts of hydrogen are harmful to either. As a result of the work of these investigators it has been possible to establish the validity of the "steam unsoundness" hypothesis.

Elimination of Porosity—There is little doubt that nearly every foundryman has encountered the problem of porosity at some time and has devised methods of dealing with it. An indication of the variety of remedies for eliminating porosity is seen in the number of different suggestions to be found in the literature. These are probably only a small part of the total, since the unpublished practices must be many.

Many publications contain references to the preferred methods of making sound castings. Primrose[44], in 1910, advocated a sufficiently high pouring temperature to insure a pressure-tight structure. He said that metal poured too cold gives too rapid contraction and hence, porosity. Karr and Rawdon[45] presented a paper in 1916 wherein they contended that control of the pouring temperature was the primary consideration in obtaining good castings. Two years later Carpenter and Elam[46] wrote a paper taking the same viewpoint. Working with Admiralty metal, they gave a narrow range of temperatures for pouring and stated that no matter how hot the metal might be heated, as long as it was poured within this range, the castings would be satisfactory.

Advocate Oxidizing Atmosphere

Woyski and Boeck[30] stressed atmosphere control, urging that proper control of melting conditions would eliminate gassing of the metal. They advocated an oxidizing atmosphere over the melt and went so far as to state that gassed metal could be brought back to normal by melting in an oxidizing atmosphere. Bolton and Weigand[33] said that gases acted to prevent feeding by creating a "back pressure"; they recommended a neutral atmosphere, proper gating, and the correct pouring temperature to secure nonporous castings. Reducing atmospheres in melting, they state, cause incipient shrinkage. Two seemingly contradictory suggestions were made at the same time. Smithells[35] recommended melting in a hydrogen atmosphere to improve metal soundness, and Brazener[47] said that copper oxide added to copper prior to adding the deoxidant will tend to remove dissolved hydrogen.

Prytherch[48], in 1930, said the degree and nature of gas unsoundness in copper depends on the pouring temperature, solidification rate and the shape of the ingot. He said that dissolved gas could be removed by: (1) slow solidification of the metal in the crucible and then quickly remelting, (2) passing nitrogen through the melt, and (3) melting in vacuo. Prytherch believed that the rate of oxidation of hydrogen from the melt was too slow to make removal of the gas this way feasible. Daniels[49] in the same year suggested that melting practice was the important variable.

A slightly different idea was proposed by Masing[50] who said that if oxygen could be eliminated from the metal, much greater soundness would result. Rowe[50] offered centrifugal casting as the answer to making sound metal. A number of papers have been written of a descriptive nature, recommending some particular gating and risering technique as the best way of obtaining sound castings. Howard[39], Logan[51], George[52], Hopwood[41], Smith [52] and Longden[42] all published articles of this type for the foundrymen.

Hesse[37] suggested that the problem of casting sound tin bronzes could be solved by substituting nickel for part of the tin, shortening the freezing range, and hence obtaining less porous metal. Pearson and Baker[9] confirmed experimentally the practice of oxidizing the metal bath to remove hydrogen and then using a deoxidizer to remove the oxygen or convert it into some inert oxide. This is satisfactory, they contend, except when the molten alloys contain elements with a high affinity for oxygen.

Recently Pell-Walpole[54] discussed the use of a flux for degassing chill-cast tin bronzes. He believed that melting the alloys under oxidizing fluxes improves soundness and mechanical properties. After prescribing proper fluxing procedure, Pell-Walpole noted the fact that aluminum used instead of phosphorus for deoxidizing gives bronzes higher densities and better hot-rolling properties, but seriously impairs the mechanical properties of castings because of trapped oxide skins. Control of the oxygen content is important in making sound copper castings, according to McIntyre[55], since absorption of hydrogen and reducing gases will be higher when the oxygen content is low. McIntyre sees no great need for the use of deoxidents.

A recent paper by Baker and Child[56] is probably the most complete on this subject. The authors regard hydrogen in the metal to be responsible for most of the serious difficulties attributed to gases, and consider several methods for the removal of this gas. In the absence of elements that form comparatively insoluble oxides, they state, hydrogen may be elim-

(*Concluded on page* 141)

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(*Concluded from page 136*)

inated by oxidation of the melt followed by deoxidation to remove the excess of oxygen added. They recommend fluxes containing CuO as the oxidizing medium and phosphorus as a possible deoxident. Whenever phosphorus or zinc is present in fairly large amounts, however, (as in phosphor bronzes or gun metal) the oxidation-deoxidation technique proved inapplicable. They found that practically all bronze alloys can be degassed rapidly by a scavenging treatment with dry nitrogen, but the zinc fumes and zinc loss make the process unattractive when the bronze contains zinc. The authors used manganese ore charged in the bottom of the crucible for reducing the gas content of the gun metals and believe the action largely due to a scavenging effect of gases liberated from the ore.

Conclusions—While it is apparent from consideration of the literature that much work remains to be done on the subject of gas porosity, it is also true that much progress has been made. Admittedly, the theory of unsoundness caused by gases is still in the formative stages. Nevertheless, enough investigations have been conducted with encouraging results to enable the foundry metallurgist to approach and understand his problems more effectively. From the concurring work of numerous investigators it is possible to infer a number of conclusions, many of which are funmental, all of which should be useful to the foundryman. Some of the more significant conclusions follow:

1. Unsoundness in bronzes is usually due to the combined effects of solidification shrinkage and evolution of dissolved gases.

2. Solubility of a gas in a metal at any given temperature is proportional to the square root of the partial pressure of the gas (Sieverts' Law).

3. Solubility of hydrogen in copper is very nearly proportional to the temperature, while the solubility of hydrogen in molten copper-tin bronze is a function of the tin content, decreasing rapidly from 0-40 per cent tin.

4. While no direct measurement of the solubility of hydrogen in solid bronze has been made, the change in solubility at the solidus has been estimated to be 0.3 cc/100 g of metal—approximately one-tenth that noted for pure copper.

5. It is generally agreed today that hydrogen, hydrogen-oxygen and water vapor are the principal causes of gas porosity in bronzes. The fact that carbon has been found to have a small, but appreciable, solubility in copper and bronzes indicates that the carbon gases, CO and CO_2, although believed to have negligible solubility, may be important secondary sources of gas unsoundness. Sulphur dioxide supposedly is a minor source of porosity in copper and copper alloys, although it has been reported that the type of porosity caused by SO_2 does not harm mechanical properties. Nitrogen has been found to be inert to bronze.

6. It has been ascertained that hydrogen and oxygen can co-exist in molten bronze and recombine upon solidification. Also, hydrogen is said to react with oxides in metal to form steam.

7. Methods for dealing with the problem of gas porosity are numerous and include recommendations of controlled pouring temperature, atmosphere control, proper gating and risering, presolidification (slow solidification of the metal in the crucible and rapid remelting), passing an inert gas through the melt, and vacuum melting. Some of the more recent suggestions involve oxidizing the melt to remove hydrogen and then using a deoxidizer to remove the oxygen or to convert it into an inert oxide. This technique might be carried out using an oxidizing flux during melting and using phosphorus as a deoxidizer. The use of manganese ore charged in the bottom of the crucible for reducing the gas content of gun metal has also been recommended.

8. While it is generally agreed that gases in bronzes are usually harmful, the presence of small amounts of dissolved gas is said to be beneficial in distributing shrinkage porosity more uniformly throughout a casting that necessarily must be inadequately fed.

The opinions or assertions contaned in this article are the private ones of the author and are not to be construed as official or reflecting the views of the Naval Department or Naval Service at large.

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MAN-TO-MAN on the Molder's Bench

"The Hand-Squeeze and Palm-Roll Sand Test"

By RALPH L. LEE

IT MUST be largely a matter of practice or experience, but, whatever it is, I haven't quite mastered this hand-squeeze and palm-roll sand test I see so many old-timers use. With my copes dropping out on me on one hand and with miss-runs and blows on the other, I decided to rig up one of these drying and weighing tests I have been hearing and reading so much about.

So I took an old electric heater we had around the place, together with a chemical balance, a little metal pan, a pencil and a pad of paper and went to work on some samples of sand from a pile I had just tested by hand. I soon found that I had a long way to go before my hand would tell me the difference between 5, 6 or 7 per cent moisture. When I discovered that with a little practice I could run a test in a matter of minutes and that my molding troubles were a whole lot less, I decided to chuck my hand testing.

Shortly after this and still hopped up on percentage of moisture, I asked a foundry-owner friend, as we went down through his plant, what the moisture content of his sand was. "Hell, Doc," he said, "I don't know what it is in per cent, but the boys know how to keep it in shape; they can tell by the feel." When I told him that I couldn't tell and still keep out of trouble, he said it was a matter of experience. While he didn't tell me himself, I learned later that he had a complete sand-testing outfit all covered with dust out in the storage room. I must admit that this experience kind of took the wind out of my sails and left me with a little suspicion that my friend was rather old-fashioned in spite of the good castings I knew he turned out.

Later I went through a much larger foundry equipped with an elaborate sand-conditioning system—muller and everything. Again I found the sand-testing apparatus all covered with dust and sand being squeezed by hand all over the place. I was just about to inquire as to the "why's" and "wherefore's" when my guide excused himself for the auto-call.

When I had just about decided that sand-testing to standard measurement was perhaps too theoretical for me and that I had better get in a little practice on the old reliable hand

squeeze, I visited still another foundry. But in this one they actually looked hurt when I said that I supposed they, too, used the old stand-by hand squeeze and palm roll. In fact, they marched me right back to the lab and showed me not only the moisture test but permeability and strength in process, with the remark that they couldn't see how anyone in their right mind would even try to run a foundry without similar tests.

In still another foundry they told me I needn't feel so downhearted at the unreliability of my hand tests and that there was one whale of a lot of scrap and customer trouble caused by certain individuals who were just kidding themselves into thinking they were geniuses with their hands, either that or they were just too lazy to do what they knew they should do.

By this time, I didn't know what to believe, so as a last resort, I went to a man I knew I could trust, for he spent all of his time helping foundry people out of trouble they couldn't get out of by themselves, and told him of my predicament. He advised me to keep my shirt on because he had learned long ago that contradictions in viewpoint and practice were just as much a part of foundry routine as the sand and molten metals themselves. "The truth of the matter is, Doc," he said, "that there isn't a business in which you can get by with as much murder, as far as science is concerned, as you can in the foundry. Everything in it varies all over the lot and there is less known about certain features of it than any other business I know. Not only that, but the things we do know aren't very romantic.

"Even with your little experience, you know Doc, there isn't anything very exciting about routine tests and reports. They are prevention measures like seeing your dentist twice a year, watching your diet, or tapering off on liquor. Most foundry people," he went on, "know what they should do and usually do it for awhile, then they slip up once and when they aren't immediately struck dead, they slip again, then several times more, 'til one day they are yanked up short with scrap trouble or customer trouble to the fact that they have a chronic case of foundry toothache, ulcers, high blood pressure or D.T.'s and a complete breakdown of their routine trouble-prevention system."

I felt a whole lot better about routine tests after talking to this fellow but I wouldn't go all the way with him when he inferred that the foundry business had any more contradiction or conflict in it than any other business. I concluded that it wasn't the business—it's the people in the business and they are all pretty much alike regardless of their business, at least in one respect, even as you and I—it is just this: "Most of the things people do are done because they feel like doing them not because they think they are the best."

But just the same, I think that those who do more of what they think is best, regardless of how they feel, usually find themselves on top of a heap composed of others who wonder why they aren't on top too.

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FOUNDRY VENTILATION

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from the shakeout, it may be necessary to reclaim and reintroduce to the sand system some or all of the sand particles removed by the exhaust system.

2. Bond and Seacoal Loss. Some loss to the exhaust system of these relatively expensive additions is unavoidable. In systems where shakeout is continuous, it is often feasible to reclaim attractive proportions of bond and seacoal from the dust collector.

3. Duct Plugging from Condensation. During the winter months condensation of steam on some duct walls, followed by adherance of sand particles and plugging of the duct, may occur where considerable steam rises from the sand during its return to the storage bins. Plugging is most prone to occur in branches at high elevations such as elevator head and sand screen connections. This is especially true if penthouses are utilized to obtain the necessary headroom for the sand preparation equipment.

Prevention of this condition involves keeping exhaust duct temperatures above the dew point of the air in the system. Addition of unit heaters in the area, or strip heaters on the ducts is the usual cure.

4. Blast Gates. Blast gates in branch ducts of an exhaust system are an essential part of the system. They assist in providing desired air distribution between the various branches, and prevent excessive loss of good sand, bond and seacoal by regulation of an exhaust volume to a minimum quantity needed to prevent dust dispersion. Tests on a 7-in. branch at a magnetic pulley exhausting 1170 cfm with blast gate open indicated removal of 84 lb per hour. Reduction in exhaust volume to 640 cfm reduced sand pickup to 7½ lb per hour. Similar tests on a 10-in. branch from sand bin disclosed removal of 144 lb per hour with exhaust volume of 2490 cfm, 2 lb per hour with 1690 cfm. After adjustment, dampers should be locked in place to prevent alteration from the correct setting.

Casting Cooling: In a production foundry, rate of castings leaving the shakeout often requires elaborate handling facilities to transport them to the cleaning room. Provisions for cooling ranges from stacking in available floor area to moving storage systems providing the required cooling time. Castings in many such cases can create problems of excessive heat and not infrequently produce quantities of irritating smoke from internal cores not removed in the shakeout cycle. Dust problems from burned sand may also be involved at the points where castings are handled or where they are jolted in the conveying system.

Ventilation of the cooling areas must be anticipated in many such cases and many involve shields against heat radiation, and modified local exhaust ventilation for smoke and fumes. In some cases heat from the hot castings can be effectively utilized during the heating season.

Floor Molding: From a dust control standpoint, it is unfortunate that all foundries do not have centralized shakeout equipment and mechanical sand preparation equipment to convey sand from shakeout to mixers. The basic principle of effective, economical control of dust dictates that a dust-producing area be confined and the contaminant removed at the point of generation before dispersion to the workroom can occur. It can readily be seen how impossible the application of this principle becomes where flasks are poured over the entire molding floor area, are upset where they are poured, and the sand cut and mixed in this same large area and piled in heaps at each molding station. Obviously, the dust condition during the shakeout and sand preparation phase will be extreme except in those cases where metal pouring temperature is low and sand to metal ratio is so high that much of the sand retains a high moisture content.

Defer Shakeout Until Night

General ventilation of the foundry is seldom sufficient to prevent excessive dust concentrations, and deferring shakeout and sand preparation until the night shift offers the only means of reducing the number of men subject to such probable exposures. Generous general ventilation, thorough wetting of sand, and supply of shakeout crew with respirators is the usual prescribed protection.

The extreme situation just described can be and has been remedied in many foundries by centralizing shakeout operations at one or a few locations, and by the installation of sufficient sand preparation equipment to provide centralized, better controlled molding sand. Local exhaust ventilation can then be applied as effectively as in the completely mechanized foundry, with the only remaining problem that of conveying sand from shakeout area to sand preparation plant without the creation of additional dust problems. Delivery of conditioned sand to molding stations can be done without difficulty at nominal expense.

Cleaning Room: Control of the many dust producing operations in the cleaning room is not a difficult or involved job. Manufacturers of abrasive cleaning equipment, tumbling mills and grinders have provided effective exhaust provisions as an integral part of their equipment, and in most cases they or the American Foundrymen's Association have provided the necessary specifications on exhaust volumes required.

A number of factors deserve discussion in connection with the following typical cleaning room operations:

Blast Rooms: 1. The specification of 80 fpm downdraft for sand, grit or shot blast rooms is undoubtedly higher than needed for prevention of dust escapement from the room. The volume is based rather on the necessary air movement that experience has indicated as sufficient to provide required visibility for the operator in the room. With the variation in abrasive, amount of burned sand or scale removed, and size and shape of castings, it is probable that velocities as low as 60 fpm might provide satisfactory visibility in some cases, while 100 fpm or higher can be necessary where conditions approach the other extreme.

2. For rooms of unusual proportions, it may be economical to treat the room as a tunnel, pulling the air horizontally, parallel to the long dimension, and maintaining 100 fpm over the vertical cross section of the room.

3. Regardless of the exhaust volume, dust concentrations will be excessive in the breathing zone of the operator inside the room unless an approved positive pressure type of respirator is worn.

4. Regardless of the exhaust volume, doors to the room must be air tight or quantities of dust will escape to the cleaning room. The velocity of abrasive travel is too much to be deflected and turned back by any practical indraft air velocities through an opening to the room. This is true whether direction of abrasive travel is produced by the blast gun or simply from ricocheting from casting surfaces.

Tumbling Mills: 1. Current recommendations on exhaust ventilation specify a branch duct diameter equal to one-sixth the inside diameter of round mills; for square mills, add 1 in. to one-sixth the inside dimension of a side to obtain recommended branch diameter.

2. Pressure loss through tumbling mills is very high and the static pressure in the branch connection will be generally between 3 and 4 in. velocity pressure where diameters of hollow trunnions are the same as the branch diameter. This means a static pressure of 3 to 4-in. if 4000 fpm is the conveying velocity in the branch, 4½ to 6 in. if 5000 fpm is required. This high pressure loss is frequently overlooked by designers of exhaust systems. It further suggests that tumbling mills should not be connected to systems exhausting other dust-producing equipment having low pressure losses until the added power consumption of

(*Continued on page* 146)

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FOUNDRY EQUIPMENT

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such combinations has been evaluated.

Where inside diameters of hollow trunnions are appreciably less than specified exhaust duct diameter, pressure drop becomes an extreme value, or exhaust volume drops to a markedly reduced quantity.

3. Exhaust ventilation is essential for maintaining efficiency of the tumbling operation. Burned sand and core sand particles must be removed from mill interior as they break loose from the castings, to eliminate a cushioning effect which retards the cleaning action. Numerous cases could be cited where tumbling cycles have been cut in half when an ineffective exhaust system condition was corrected.

Dust loading in the exhaust air varies as the tumbling progresses, being extremely heavy at the start, and tapering off gradually until concentration is moderate at the end of the operation. Where quantities of sand to be removed are large, it may tax the conveying capacity of the air stream in the branch connection. This situation is indicated by quantities of sand particles dropping to the cleaning room floor from the tramp iron trap. It explains the specifications of sufficient volume in branch connections to maintain 5000 fpm velocities (5000 fpm in a given size duct will convey approximately 3½ times as many pounds of material as a velocity of 4000 fpm in the same duct). Where sand quantities are not extreme, exhaust volumes based on 4000 fpm in the branch duct will provide effective dust control and will maintain sufficient conveying capacity to prevent loss of sand with its inherent dust problem from the tramp iron trap.

4. Tumbling mill doors must fit tight to prevent spillage. Seeping sand fines through faulty doors can produce dust concentration far in excess of accepted threshold standards.

5. A number of stave type mills still in service cannot be internally ventilated. Such mills must be provided with an enclosure, Fig. 13. Recommended exhaust volumes are shown in Table II.

Grinding and Cutoff Wheels: Control of dust from pedestal grinders was one of the first dust-producing operations that received study in this country. Exhaust volumes and hood designs have been practically standardized to conform to the AFA or various state codes covering this operation.

Hooding of an abrasive cutoff saw for removal of sprues and risers cannot be as concisely defined. In many installations exhaust hood must be located some distance in back of the wheel, and in such cases volumes higher than the minimum requirements are recommended. Where the hood cannot be located around the area of dust generation, a minimum branch size of 6-in. diameter is suggested, exhausting from 900 to 1000 cfm.

Swing Frame Grinders: With the quantity of fine dust dispersed by the swing frame grinder, it is surprising that dust control was not more extensively applied to this operation until recent years.

Studies of local exhaust ventilation have indicated that exhaust hoods, attached to or located close to the grinding wheel, have not proved practical or effective except in specialized instances. The booth type enclosure, Fig. 19, on the other hand, has produced effective control with indraft velocities of 100 to 150

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fpm through the face opening, and has not interfered with the grinding operation or the flow of castings to or from the swing frame stations.

In some instances, where direction of dust and spark travel approaches or exceeds a 180° arc, the booth method has been adopted by grinding within instead of outside an open front booth or room.

Portable Grinding: About the last dust problem to receive attention in the cleaning room has been the portable grinding operations. Here again, like the swing frame grinder, the use of hoods around the grinder has proved impractical. Local hoods in the vicinity of the grinding operation must be located in the direction of dust travel and must be frequently relocated by the operator to be effective. Where control required such maneuvering, it is a rare instance that its use is continued by the operator after the first few days.

Effective control of portable grinding operations can be divided into the following three groups, depending on the casting size.

1. Ventilated workbenches or tables are used for smaller castings. Work top is usually grilled, and downdraft exhaust ventilation is applied at from 150 to 250 cfm per square foot of bench area that defines the dust producing zone. Side and back shields increase the effectiveness of the exhaust air, and stop the horizontal trajectory of sparks and heavy metallic particles thrown tangentially from the wheel. Ventilated benches or booths, Fig. 21, used extensively during the war in the finishing of aviation castings.

2. Rooms or booths provide the isolation and flexibility needed for dust control during portable grinding of larger castings. Fig. 20 illustrates a construction that employs acoustic materials offering desirable reduction in noise level in addition to exhaust ventilation. The fine dust particles are carried away from the operator, to the exhaust manifold in the booth rear.

Slotting of the booth top for monorail chains is suggested to facilitate moving of heavy castings to and from the grinding booths.

An indraft of 100 to 125 fpm through the vertical cross section of the booth provides excellent dust control.

3. Floor grilles, Fig. 11, lack the positive direction of exhaust air flow that is obtained with the bench or booth. They do permit a minimum layout change in the portable grinding area and simplify handling by overhead crane.

Effectiveness of floor grilles would be greatly increased if side shields could be included to surround the area and prevent air short-circuiting into the grille from below the elevation of the grinder.

Exhaust volumes of 150 to 200 cfm per square foot of gross floor area where grinding is done, is recommended. To obtain better distribution, part of the area frequently is blocked off to increase the velocities through the grille to from 500 to 1000 fpm.

Heat Loss and Makeup Air: As recirculation of cleaned air from dust collectors back to the foundry is not recommended today, with the possible exception of exhaust from metallic grinding operations, the heat loss from the air volumes exhausted is appreciable. Until recording and measuring instruments are available that would immediately indicate excessive dust concentrations in cleaned air from dust collectors, there is little hope that return of air from most foundry operations will be favored by the industrial hygienist. It is impractical in most foundries to make the necessary dust loading determinations at the frequency required to immediately catch return of excessive dust concentrations which can be caused by defective material, abrasion, wear, or lack of maintenance with present-day dust collecting equipment.

Heat loss can be reduced by the substitution of local exhaust ventilation for general ventilation. This possibility has

(*Concluded on page* 150)

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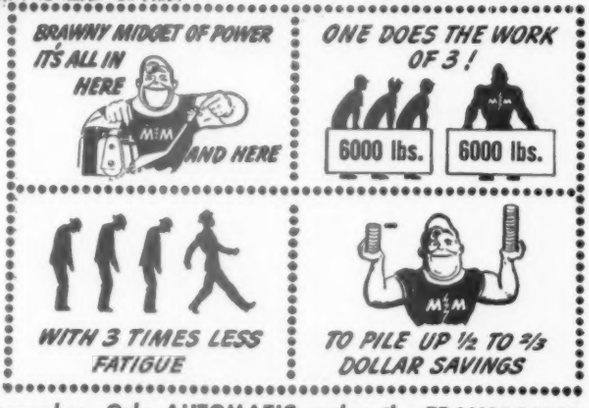

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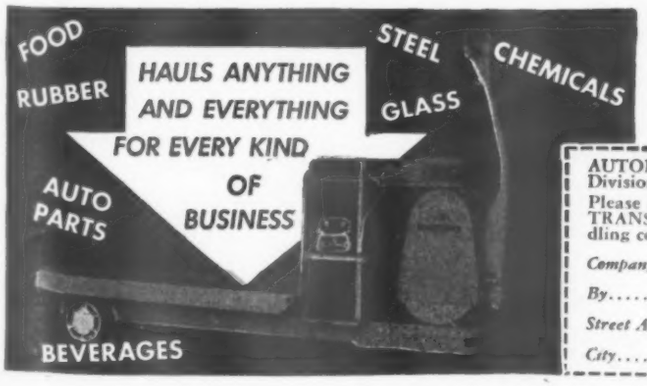

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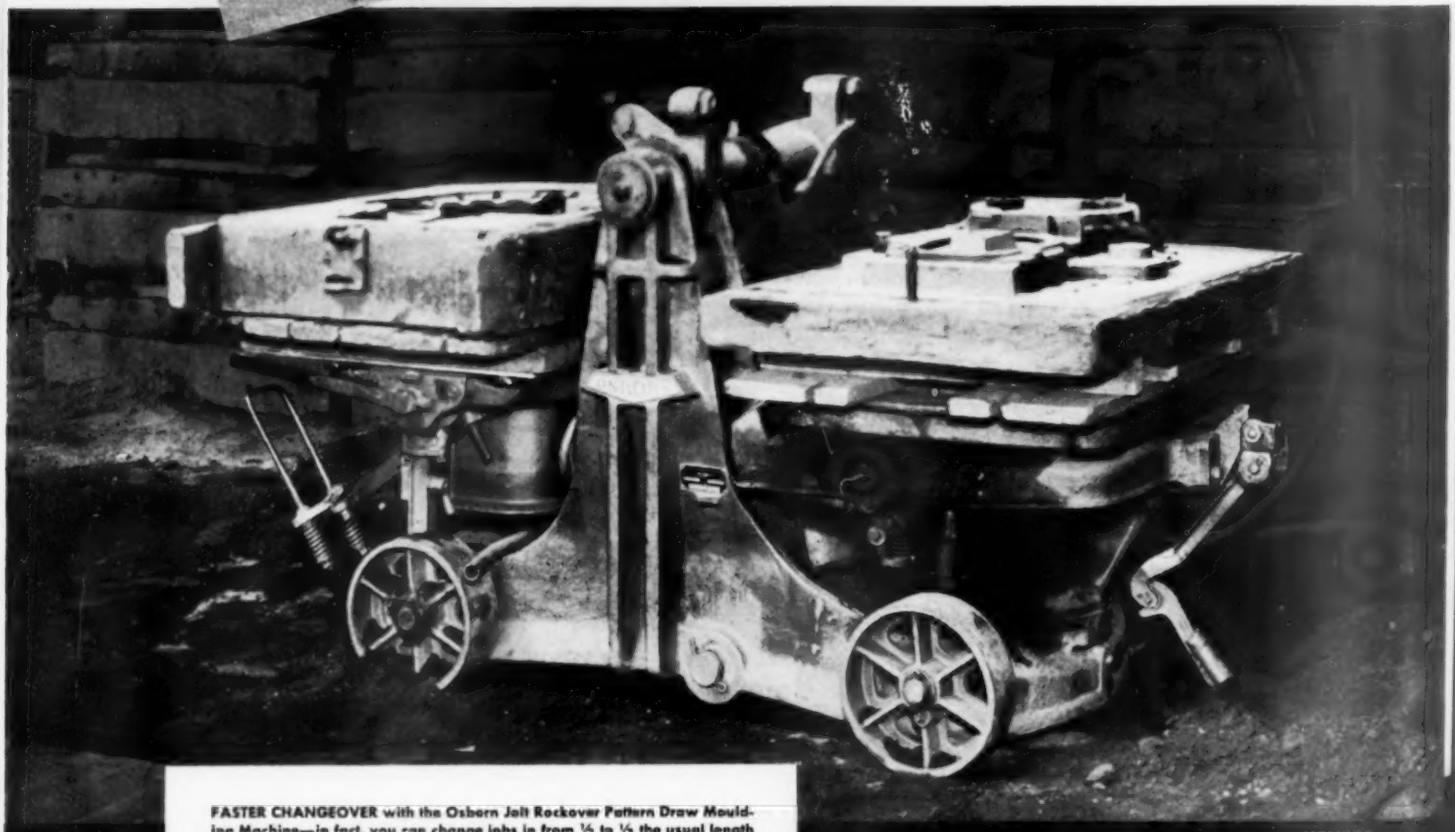

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MOULDING MACHINES

(*Concluded from page* 146)

been discussed for the control of melting furnaces, for the use of centralized shakeout and sand preparation equipment. A better understanding of this waste on the part of supervisory personnel would pay dividends, as it is the rule rather than the exception to find all exhaust fans in continuous operation regardless of any extended stoppage of dust, fume, or smoke generation at the operation or in the area. The following examples will illustrate this contention:

1. Roof ventilators may be used to exhaust smoke during pouring. Such ventilators are probably equally spaced down the length of the molding floor if castings are poured over the entire floor area. Yet in a long foundry building, the amount of ventilation required at the far end of the room when pouring occurs at the near end will be a fraction of the volume required when the situation is reversed. The stopping of exhaust fans in the roof when they are not required could result in appreciable heat savings.

2. Local exhaust ventilation on an electric melting furnace can drastically reduce the volume of air required to control that operation during the melting cycle. Much of the smoke released in pouring the metal to the ladle will escape such a hood attached to the furnace and supplemental general ventilation will be often employed.

Pouring may require 5 minutes out of a 2 to 5 hour melting cycle, yet the auxiliary fans needed only during the pouring operation will frequently be running during the entire shift.

3. On larger shakeouts, the total shakeout time represents a small fraction of the time involved in bringing flasks to and from the shakeout and waiting for the sand handling equipment to clear the shakeout hopper of its accumulated sand load. The chart, Fig. 16, describes this condition and was clocked on a 6 x 16-ft shakeout exhausted by 40,000 cfm.

During the heating season, a timer that would stop the dust collecting system or partially close a damper 5 minutes after the shakeout grate was stopped, starting the exhaust again either automatically when the shakeout was started, or manually by the operator as a new flask was swung into position, would save many a Btu.

4. The cleaning room should be even more carefully watched for unnecessary heat loss, as little of the heat released in the solidification and cooling of the casting is available in this area. A typical sand blast room exhausts about 10,000 cfm. This volume is required only during the actual blasting operation time which suggests:

a. A damper, Fig. 17, in the exhaust connection actuated by the opening of the blast doors, to reduce the exhaust volume during the loading and unloading operations.

b. Supply of outside air to the blast room tempered by room air bleed damper, Fig. 17. With the heavy clothing worn by the operator for protection against flying abrasive, it would seem that temperatures within the blast room could be considerably lower than the temperatures necessary in the remainder of the cleaning room.

It should be noted that with such an arrangement, warmer room air would circulate through the room when the doors are opened, due to the low resistance offered this path of air travel. This loss would be reduced by the damper in the exhaust connection discussed under (a).

5. Outside air could be used for tumbling mill ventilation by attaching a manifold to the hollow trunnions on the air-entering side. With such a modification, room air would be removed only when the doors were removed to load or unload the mills.

Air Supply Systems: It is difficult to be specific in discussing the need for air supply systems to make up for the quantities of air discharged to the atmosphere by the various exhaust systems. Foundry space, shape of buildings and method of handling vary widely and most foundries have relied on the frequently opened doors and other openings in the building for the source of makeup air to replace that exhausted. However, it is this situation that causes the pronounced cold drafts whenever a door is opened, rather than a situation of unfavorable prevailing winds.

Drafts of this type could be eliminated with an air supply system, and with the excess heat from molten metal available, such systems offer an intriguing set of conditions for the designer to utilize.

An air supply system would also assure discharge of intended exhaust volumes from all systems. Local exhaust systems employ centrifugal fans producing static pressures from 3 to 10 in. water gage. Air will be moved through these systems at the expense of reduced volume through low pressure general ventilation fans if sufficient makeup air for all systems is not available. Under extreme conditions, air can be drawn in the reverse direction through ventilation fans to satisfy the demand of exhausters on local ventilation exhaust systems.

Conclusions: Any discussion of foundry ventilation highlights the following points:

1. Local exhaust ventilation is far more positive and economical than general ventilation and warrants all possible effort in its application to as many of the foundry problems as may be possible.

2. The designer of exhaust systems should recognize that exhaust volumes used in sand handling and preparation equipment, blast rooms and tumbling mills must be selected not only to prevent dust dispersion, but also to accomplish certain other functions essential to the operation.

3. Added study is indicated to more accurately forecast exhaust volumes required for large shakeout dust control.

4. A more co-ordinated system of air supply, general and local ventilation could more economically solve the numerous problems of heat, smoke, fume, and dust generation.

5. With the quantities of contaminants generated there will be increasing pressure for improved conditions within the foundries, and reduction in quantities released to the atmosphere.

6. No other industry faced with the magnitude and variation of ventilation problems of the foundry field has made such pronounced strides in their control in recent years.

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1. "Code of Recommended Good Practice for Metal Cleaning Sanitation," American Foundrymen's Association.
2. Grinding, Polishing and Buffing Equipment Sanitation, American Standards Association. Form Z43-1941.
3. Industrial Code Rule 10, New York Department of Labor.
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5. "Industrial Health Hazards in Magnesium Foundries," *Illinois Labor Bulletin*, September 30, 1942.
6. Witheridge, W. N.—"Control of Industrial Atmospheres," *Heating, Piping and Air Conditioning*, January, 1945.
7. Kane, J. M.—"Application of Local Exhaust Ventilation to Electric Melting Furnaces," AFA *Transactions*, June, 1945.
8. Kane, J. M.—"Swing Frame Grinder Dust Control," THE FOUNDRY, August, 1944.

New Iron Foundry Organized

Atwood Iron Industries Inc., Grand Rapids, Mich., a new company, has been formed and has begun construction of a foundry, to cost $200,000, for the production of ferrous castings for automotive and general industries. Charles H. Attwood, president of Attwood Brass Works, Grand Rapids, is president of the new company, and Byron H. Cook, is secretary and treasurer. Temporary headquarters will be at the office of Attwood Brass Works.

Foundries Merged

Lectromelt Steel Casting Co., Barberton, O., and the Barberton Foundry Co., that city, have merged under the name of the Lectromelt Casting Co. There will be no change in personnel or management. The company produces steel and gray iron castings.

DON'T WORRY ABOUT *Ram-Offs* WHEN YOU USE MILWAUKEE JOLT SQUEEZERS

BETTER MOLDS AT LOWER COST!

No. 103
STATIONARY TYPE
(above)
10" squeezing piston. Accessible from three sides. Equipped with overhead, self-cleaning valves.

No. 124
PORTABLE TYPE
(right)
12" squeezing piston; steel wheels and mold shelf. Easily and quickly portable.

Take a load off your mind . . . eliminate once and for all the troublesome, costly problem of ram-offs. Do it with MILWAUKEE Jolt Squeezers, designed to maintain the original parallelism between table and platen when squeezing, regardless of hinge pin wear — a type of construction that makes ram-offs impossible.

MILWAUKEE Jolt Squeezers are ruggedly constructed. Cylinder, piston and jolt table are close-grained, semi-steel castings machined to close tolerances to insure long life . . . cast piston rings of uniform tension are on both the jolt and squeeze pistons . . . the guide pin is a drive fit in the jolt table, and operates in a close-fitting bushing pressed into the cylinder. Back frame and arm are cast steel for rigidity to prevent deflection when pressure is applied. Renewable surfaces are provided at wearing points to simplify and reduce maintenance.

Write for complete details on dependable MILWAUKEE Jolt Squeezers that enable you to produce better molds at lower cost.

MILWAUKEE *Foundry Equipment Co.*

3238 W. PIERCE STREET, MILWAUKEE 4, WISCONSIN, U.S.A.

A DOCTOR DISCUSSES FOUNDRIES

(*Continued from page* 109)

The problem of supervision insisting on the worker using safety and protective appliances has largely been bypassed during the war. Many plants felt that they did not dare risk losing an employee by insisting that he use the proper safety equipment, yet many plants have lost an employee because of injuries sustained where the the equipment was not used. There must be a re-education program in the use of safety equipment and I think this is best accomplished by personal talks with the worker, explaining the reasons why such things are necessary. This equipment must be available at the site of the operation and must be in the charge of a person who understands its proper use and comfortable fitting.

Instruct the New Employee

Foundry work *is* heavy work, but not heavier or harder than found in many other industries. Back strains, the most common result of this hazard, can best be reduced by a few minutes' explanation, to the new employee, that in lifting heavy objects he must use his head and lift with his legs. Heavy work exists in every industry. A personal observation between the number of back strains in foundries and in a war ordnance depot over a two-year period show that there were 6.6 per cent in the foundries, and 11 per cent in the ordnance depot, which was not considered "hot, heavy or dirty." A similar observation concerning the toe and foot injuries over the same period of time and in the same companies showed 6.1 per cent for the foundries and 20 per cent for the ordnance depot. I have no experience to give on the use of safety shoes because the foundries with which I deal will not insist upon their being worn by the workers; but at the ordnance depot, the percentage of toe and foot injuries during the first year was 14 per cent and during the second year was 6 per cent. During this second year period, 55 per cent of the employees wore safety shoes.

Dirty, of course, refers to the molding sand, which is black—but it is clean. This black molding sand is a very special hazard, but no foundry can operate without it. It is a hazard because it cloaks every worker with its black film and characteristic odor. It is a hazard which handicaps the industry in its effort to secure apprentices. Here is a hazard which cannot be removed from the industry, but which can be removed from the worker.

Molders' sand is black but it is not dirty. The flour mill man and the bread maker are equally covered—but with a white dust which may contain much more actual dirt and many organisms—but it looks clean.

Management must not only encourage the worker to leave the foundry in his house clothes, but it must provide all of the facilities to enable him to return to his home ready to sit down to the evening meal. Many plants built under war necessity and with war funds have, as new and modern units, taught workers that they can expect the facilities of wash stands, showers, and individual lockers. Can you entice those workers to your plant if you cannot offer them the same? Foundries have become known as a dirty industry, not because of technical operations, but by the appearance of the man on his way home.

Hazards depending on the employee are in direct proportion to the quality of his physical condition. Definite physical standards should be adopted for the acceptance of men into an industry which carries a fairly high accident rate. A worker who has only one eye is certainly not capable of depth perception, and he is no more safe pouring hot metal than he would be operating a crane.

Degrees of deafness preclude a worker hearing warning calls or even work instruction, in an industry which is fairly noisy. Chronic upper respiratory infections have no place in an atmosphere that is dusty and in a smoke content that is not injurious to a worker in good health. Men with orthopedic deformities of the spine and legs should be accepted with caution, and while they may do well at a grinder's bench, they should never be allowed on the floor. Persons with previous history of back injury should not be allowed to recur an old complaint at your expense. Employees with hernias should never be subjected to lifting operations. Men with varicose veins should not be subjected to molten metal burns. These same burns do not heal well in diabetics. Venereal disease, especially syphilis, is a personal hazard, not from the standpoint of contamination of the fellow worker, but because it usually produces a long lost-time accident from delayed healing. Men with heart disease should not be subjected to the strains of heavy lifting, and men with tuberculosis should *not* be employed. This brings us to the subject of silicosis or the greater hazard, silico-tuberculosis.

Let me say at the outset that the hazard of silicosis is not as bad as it is portrayed, since the disease has become recognized as being of industrial origin. The number of silicotics who are disabled because of their silicosis is far less than the number of men who have silicosis, and the presence of silicosis on x-ray findings does not mean that a man is incapable of continuing his work for an unestimated period of years.

It is pretty well established that it takes between 20 and 30 years or more for a worker to reach a point of disability due to *uncomplicated* silicosis, and it has also been established that the *tubercular* worker exposed to silicon dioxide may become disabled within a very short time. In review, let us remember that the accepted safe dust count is below 5,000,000 particles per cubic foot of air, that the particles must be below 10 microns or less in diameter and that this dust, to be hazardous must contain more than 15 or 20 per cent of free silica.

Allow Air to Clear

In one plant under my observation, we found that the operation of the sandblast room during the cleaning of small castings, which could be placed entirely within the blast room, was satisfactory. However, it was also found that over a minute should be allowed following the application of the blast for the air to clear before the worker would enter to readjust the casting. If this was not done, he would be exposed to a very high concentration of silica dust and should have been wearing a filter respirator. The exhaust duct from this sandblast room terminated below the roof level immediately outside the wall of the building and in such a position that the dust could and did re-enter the room through a nearby door, thereby exposing other workers. When large castings were placed in this room the doors of the blast unit could not be closed, and the result was that the blast of sand was not only disseminated into the workroom in which the blast unit was placed but was also shot directly into the foundry proper.

To make a foundry healthy requires frequent and regular surveys of these types of hazards.

Silicosis produces a fibrosis in the tissues of the lung which develops extremely slowly. The disability in silicosis depends upon the amount of fibrosis, the loss of elasticity in the air cells of the lung and the resulting loss in the power of the lung system to oxygenate the blood properly. This leads to the symptoms of shortage of breath, anemia, and loss of weight and strength—all of which are considered to be disabling conditions. Silicosis shortens working life because it not only is accompanied

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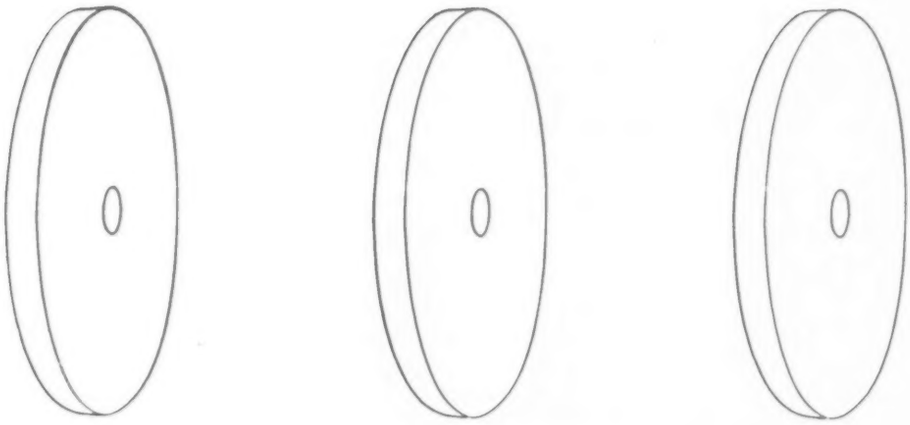

There's more to grinding wheel grades than the A, B, C's

The A, B, C's which appear as identification on a grinding wheel help simplify proper grade selection. By clearly showing relative hardness, they make it easier to select the correct wheel for the job. That's one reason wheels by CARBORUNDUM are plainly marked. But, there's more to it than the old chestnut, "the softer the metal, the harder the wheel." It's not that easy.

You realize, for instance, that wheel speed itself affects grinding action. The same grade reacts differently at various speeds. The condition of the machine and the amount of vibration can make a difference. Desired finish . . . required tolerance must be considered. Coolant conditions vary. The actual type of operation — snagging, surfacing, internal grinding or whatever it is — influences practical selection.

Yes — there are many important factors to check before you can be sure of the right grade designation for the job.

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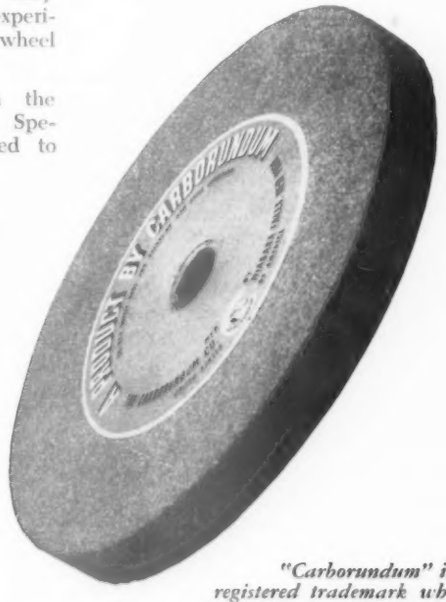

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(*Concluded from page* 152)

by the changes just stated, but it opens the door to lung complications both in tuberculous and nontuberculous persons. It becomes imperative, therefore, that every worker have a competent chest x-ray before he begins his employment and regularly thereafter.

Silicosis that causes disability, whether or not it is complicated by tuberculosis, is compensable in the state of Ohio as of July, 1937; therefore, the state has only a little over eight-years' experience with this occupational disease. Ohio has no law defining injurious exposure or safe concentration of silica dust. It recommends the safe concentrations that were mentioned before. The Silicosis Act of Ohio does not make it necessary in determining the compensability of a claim to inquire into what concentration of dust is injurious, and what concentration is noninjurious. It only requires that the disease must be causing total disability. When that condition has been reached, no one questions but that the claimant has had exposure to silica dust that was injurious to him.

Last Employer Pays Claim

However, the question of determining the employer against whom the cost of the claim should be charged does arise. The rule of the acturial department of the Ohio Industrial Commission is that the full cost of the claim shall be charged against the latest employer in whose employment the claimant was exposed injuriously. Since the state of Ohio requires that total disability must begin within two years after the last injurious exposure, the commission has been very liberal in accepting any exposure at all as meeting the technical requirement of being injurious. The commission takes the attitude that if a claimant becomes totally disabled due to silicosis, then any exposure to silica dust at all, no matter how low the dust count, would be injurious to him in his particular state of health. It is thought that in the future the code of specific requirements, particularly in reference to foundries, will be charged to require certain minimum standards of ventilation, etc., and even though they may not contain a definite statement as to what is consideread a safe dust count, the question of these minimums will arise if the claimant files an application for additional award for violation of specific requirement. Should the commission find that the employer has not complied with the state safety code, it can increase the rate of compensation 15 to 50 per cent as a penalty.

In the past eight years there arose, in three types of Ohio foundries, 504 compensable silicosis claims or 57 per cent of total compensable claims in the eight-year period covered. During this period over 1700 claims based on silicosis were filed from the entire state. Seven hundred and seventy were allowed, 820 were disallowed and 172 were pending December, 1944. Most of the disallowed claims were rejected because the disability was not yet total.

Since 1937, following experimentation in Ontario, it has been known not only that silicosis can be prevented but the disease arrested in its various stages by the use of aluminum. The procedure is one of inhaling finely prepared aluminum metallic dust in special chambers at regular intervals or by inhalation from small hand operated flasks by which the worker can administer his own treatment. Both metallic aluminum dust and hydrated alumina have been used with marked success. In Ohio, nine companies administer aluminum therapy as a preventive of silicosis. Two of these are foundries.

The Ohio Industrial Commission does not recognize aluminum therapy as a treatment and will not authorize it or pay for it out of the workmen's compensation insurance fund. It does, however, recognize it as a preventive and approves, recommends and encourages its use. The Ohio commission does not consider requiring by law the adoption of aluminum prophylaxis.

Consulting actuaries in Ohio who make a careful study of silicosis claims have concluded that the employee who works in the average foundry or pottery and who becomes disabled from working earlier in life than the age of natural retirement does so because tuberculosis becomes active, and not because of silicosis. They point out that silicosis predisposes to tuberculosis; but when young men in the thirties become totally disabled due to silicosis, it is always because active pulmonary tuberculosis is present. On the other hand, many men work 30 and 40 years and have advanced silicosis but do not stop work until the natural age for retirement, and only then is it found that they actually had silicosis, but in those cases, no tuberculosis was present. They conclude again that the prevention of tuberculosis is equally important with the prevention of silicosis. They maintain that few plants in Ohio have dust concentrations of silicon dioxide that would cause a man to become totally disabled from silicosis alone.

My conclusion is that if the foundry industry maintains its high standards of mechanical safety—encouraged cleanliness and adopts physical examination both pre-employment and regularly during employment; that the expression, "hot, heavy and dirty" will be changed to "hot, heavy and healthy."

NONFERROUS COST ACCOUNTING

(*Continued from page* 102)

were "pouring off," a good customer came to your plant for a partial shipment of castings weighing 200 lb, which were ready, and that the record was neglected. There are many possibilities of incorrect costs in this transaction:

(a) That you use 9150 lb as your cost of production figures to arrive at cwt cost of $28.69

(b) 8750 lb as a cost of sales figures or $30.00 per cwt, if accruals have been considered as a factor in cost determination—in (a) and (b)

(c) $26.72 as a cost of production, and

(d) $27.94 as cost of sales if accruals are not considered, in (c) and (d)

In addition to this, the sales total would be off $64 and the total operating profit that much less.

4. Now let us assume that the $15.00 cash sale was spent to pay miscellaneous extra labor and for other small supplies; these would not appear in a check book or other books of account. In this instance our total cost would not be $2625.00 or $2445.00 as in the example used but $2640.00 and $2460.00, respectively, and our resultant cost per cwt still different from any figures yet used, but within the range of costs already developed.

5. Then there is the case with the combined wrongs of both examples 3 and 4. In this instance an entirely different bracket of costs can be developed, and it is difficult to predict what cost might be determined.

Up to this point, we have been dealing with only the following simple factors, to arrive at overall costs:

(a) Pounds of castings produced and shipped.

(b) Net pounds of casting shipped (returns deducted).

(c) Cost of production (sometimes meaning sales) under approved accounting practice.

(d) Cost of production (sometimes meaning sales) without good accounting procedure.

(e) Effect of error in record keeping applied to (a) (b) (c) and (d).

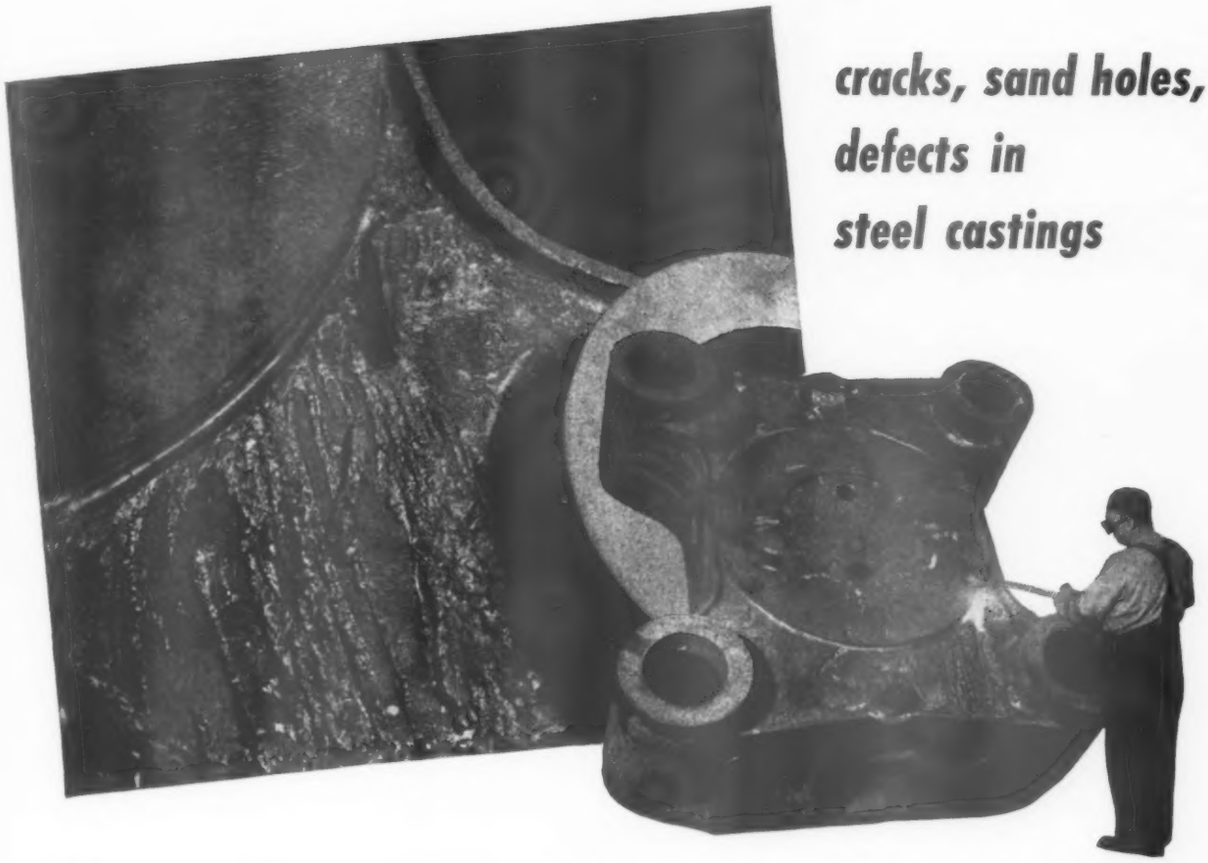
(f) Effect of faulty accounting applied to (a) (b) (c) (d) and (e).

We now propose to use these developed costs into a conversion of molding cost per hour, which is equally dangerous for use in estimating or for selling price determination.

6. With the figures on cwt cost that have been developed between $26.15 and $30.00, there is one cost, which is definitely sure, the invoice cost of metal.

(*Continued on page* 156)

Flame Gouging...



cracks, sand holes, defects in steel castings

16 to 24 times faster than chipping

Here is why modern Airco-developed flame gouging is rapidly replacing the slow, costly practice of chipping out shrinkage cracks, sand holes and other defects in steel castings. The figures are from actual production records of one of the largest producers of steel castings.

Size of Cavity			Chipping	Gouging
Length	Width	Depth	Time	Time
4"	2"	1"	9 minutes	½ minute
21"	4"	3"	8½ hours	20 minutes
16"	2"	2"	4 hours	10 minutes
27"	4"	4"	13 hours	35 minutes
12"	9"	3"	20 hours	1 hour
18"	10"	3"	35 hours	2 hours

—And there are additional savings because, welders say, the smooth, gouged finish enables them to do a better welding job faster.

Flame gouging is one of the modern time- and cost-saving Airco processes for steel foundries described in the booklet "New and Improved Oxyacetylene Methods for Steel Foundries". It should be a "must" on every forward-looking foundry man's reading list.

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ORIGINATORS OF MODERN OXYACETYLENE AND ELECTRIC ARC METHODS FOR STEEL FOUNDRIES

(*Continued from page* 154)

Assuming that to be $13.00, he deducts it from $26.15 and $30.00, leaving either $13.15 or $17.00 per cwt to cover all factors of metal loss—cores, molding, cleaning, shipping, administration, etc.

Knowing these variable costs of $13.15 and $17.00, he then applies a secret formula. Without adequate records, he places a value of average productivity per hour on his total number of molders. This figure shows more variation than the cost per cwt. Some operators get 30 lb per hour; others get in excess of 100 lb per hour; and, as a group, we have developed overall costs per molder shown ranging from $1.80 to $12.00 for the same class of job.

7. The most prevalent answer from the small foundryman is, "We have no cost system" or "We do not know our exact cost."

The significance of this section is "What do we get out of all this?" We have costs varying from a low of $26.15 to $30.00 per cwt with twenty-two intermediate costs **from the same method of costing,** and for **the same class of castings** from **the same basic data.** It might be the consensus that the operator using the $26.15 per cwt cost figure would not be in business very long, but we cannot concur with this reasoning, as it would depend entirely on what that operator has determined by experience with his various customers as to what percentage of cost or cents per pound might safely be added as potential profit. It certainly cannot be held as a sound method of cost finding for sales price determination, and one that if it is used would be contrary to the prime business principle of being "in business to make money," and that principle should apply to all the dollars spent in any business or in any type of conversion.

With this spread in costs, it is impossible to predict the range of selling prices. It is a safe assumption, however, that prices quoted to a potential buyer could range between 22½ cents to 35 cents per pound **for the same casting.** With this condition existing, there is little wonder that the buyers and users of large quantities of brass and aluminum castings have little regard for this industry.

These buyers know better than anyone else that very few, if any, of these sources of supply know their costs and that it is always possible in normal times to have the prices "shaved off" a cent or two a pound.

It would be possible to go on and fill many pages with methods now in use. Fortunately, among these methods many of them are good and do accomplish the primary purpose of cost records. The expense incurred, if any, in keeping and maintaining the records is always offset by the operator's ability to secure better sales prices when the class and kind of work justifies the price, and by the same token, makes it possible to reduce some prices to keep certain levels of production when it becomes necessary.

Among the operators that have a consistenly good earnings record, at least 80 per cent have and **use** a cost finding method not only for sales price determination but for correctional guidance on plant activities as well. A few more have cost records but fail to get the full benefit of their use, and then, of course, there is the exception that shows a good return without any record.

It is agreed that during the present and the past two or three years, with conditions and volumes that most foundries have been experiencing, are not the one on which to make forecasts or on which to draw conclusions. During periods that can be considered normal, the industry has had a high mortality rate. The only reason that can be attributed for these fatalities, since most of the operators are experienced foundrymen, is that they did not know their costs; obviously, no person or company would sell itself into bankruptcy intentionally. It is the consensus of the operators who show consistently good earnings that an improved profit structure will result when the customer accounts are surveyed and the marginal or doubtful ones eliminated. The fact that by reducing the volume the earnings will increase is a "bitter pill" for some managers to swallow, but a condition which is 100 per cent true.

Costs Needed By All

If in this preliminary discussion of some of the methods now in use the reader has gained an impression that cost keeping is only for the "big fellow" it is erroneous, and we have failed to make our point. Cost keeping and cost records are for everyone, large and small, members and non-members alike. It is the purpose of the Non-Ferrous Founders' Society to be helpful, not just to a certain group of members or individuals but to the industry in general. Therefore, it can be taken as a fact that this group would not recommend for general adoption any plan which will be a burden to maintain or fall short in the accomplishment of its purpose.

Cost methods should not be complicated. The plan proposed herein does not involve the use of any additional data other than that which has been discussed in this manual. It is simply the recording of this data in a manner so that various cost factors can be developed.

Cost factors should be the backbone of an estimating procedure; therefore, as we progress in the development of the cost accounting methods, we automatically will develop an approved and standard form of estimating sheet.

Earlier in this section, we referred to the development of costs by the analysis of the cash account expenditure (Exhibit B) plus amounts from the reserve account (Exhibit E) applied to the sales distribution record (Exhibit G) less returns.

This analysis tells very little, and we have shown the number of distorted answers it is possible to obtain when this data is not recorded properly or completely.

To define cost, it shall be considered here as the total cost chargeable against income of the period to make and sell the product. The fundamental principle of cost accounting is that all material, labor and expense which can be directly identified with any job should be charged to that job.

With this definition, we will be concerned in the remaining portion of the section with the simplest method of recording and allocating materials, labor and expense items.

Direct Materials: Under this heading only the following classification of materials will be considered:

Virgin metal, purchased ingots, purchased scrap, special alloys.

The purchase of this class of materials at invoice price, including freight and cartage, furnishes the supporting detail to the entry in the cash account and is usually identified by an assigned account number to signify that it is direct raw materials inventory. The chart of accounts accompanying this section and Exhibit H will clarify this statement.

As no accurate costs on metal can be arrived at without a good record of inventories and since metal used is required in most all the government reports today, it is advisable to keep these records in good shape, either on a card record or as shown on Exhibit H.

As shown in this exhibit, it is recommended that a sheet be kept for each different kind of metal, ingot, purchased scrap, or alloy used. In addition, cards or sheets should be provided for shop scrap and returns. By recording on these cards or sheets the receipts of the various kinds of metal during the month and adding it to the inventory, which is shown as on hand at the first of the month, the total will be the amount of metal which must be accounted for by the cost accounting method. In some plants this record would be a daily routine; in others, or the average small plant, once a month would be sufficent.

Following this procedure, it is assumed that monthly physical inventories be taken so that actual usage can be determined or that daily records of withdrawals from the various stocks be kept

(*Concluded on page* 158)

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BETTER at final inspection

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(*Concluded from page 156*)

to obtain the amount of metal used. If the latter practice is followed, periodic physical checks of inventories will have to be made and the accuracy of the costs developed will depend on the accuracy of the inventory taken or the record keeping.

In any event, this gives us a good control over the material cost factor as a component part of our total developed cost, inherently tied up with our general accounting procedure,—provides the first basic starting point in making our estimates and certainly involves no "red tape."

Labor: This factor of cost provides the most controversial point in cost development. This manual will not stop these controversies, but we feel it will make many converts to approved methods. It is on this basis that the Non-Ferrous Founders' Society office can collect data for the interchange of statistics and ideas that will be beneficial to the industry as a whole.

The basis of all cost factors that can be developed here is the payroll. It is assumed that every operator, regardless of size has some official way of recording the number of hours that each individual works, together with the amounts of money that were earned. It is by the acceptance and use of the payroll distribution from Exhibit I that the payroll develops into a "gold mine" of information.

Recommend Five Divisions

It was only after careful consideration and the study of many methods in use by the outstanding successful operators, and an agreement by the board of directors and cost committee that the following divisions for distribution are recommended for adoption. These are: Melting, molding, cores, cleaning and general.

We do not imply that these are all the payroll distribution accounts one should have, but this is a minimum number to approach proper costing. A further study of the chart of accounts will allow for expansion and refinement to almost any desired degree and still stick to the five fundamental controls. Also in this chart of accounts we have outlined the classes of labor to be included in each account.

From this change in the payroll record, what have we accomplished in advancement in our cost factor determination? Working from the example given on Exhibit I, we find that instead of the blanket figure of $990.00 payroll, which was the only one we could get from our general accounting practice, that we now have recorded under Melting $195.10, under Cores $120.10, Molding $427.50, Cleaning $127.40 and General $119.90. The total remains the same, but when it is detailed in this manner, it is possible to arrive at component costs for various operations, that can guide the foundryman in making intelligent estimates. Just what are the possibilities from this preliminary simple distribution?

In the first breakdown of Melting with a labor cost of $195.10, it is possible to arrive at several costs per pound. These are 2.08c per pound on the gross weight of castings shipped—2.18c per pound on the net weight of good castings in the example shown, or 1.53c per pound on the total weight melted. The latter cost could not be determined unless an accurate record of weights charged into the furnace were kept. Which of these factors is used would depend entirely on the kind of overall cost accumulation method it was decided to adopt. The most important thing is to adopt and use one of these methods. For simplicity, however, it is recommended that all costs be connected to the net weight of good castings shipped, which in this case would be 2.18c per pound. One might ask now why it is important to know this fact. The answer should be obvious, because we are no longer dealing in metals at invoice cost but in a conversion cost, which includes this additional factor. Instead of metal at $13.00 per cwt, metal cost would be $15.18, and if one were using a percentage figure to cover a metal loss in melt, these additional costs might be as much or more than 20 per cent of invoice price.

Going on down the list of cost factors that can be developed from the payroll distribution, all related to the net weight of good castings, we would get the following answer:

Cores	1.34c per lb
Cleaning	1.42c per lb
Molding	4.78c per lb
General	1.34c per lb

As such, these figures are not much better than an overall total, but they do provide a basis for the foundryman to use judgment in estimates instead of guesses.

It is not very probable that the core cost figure would be used on jobs that required no cores; nor would you use a constant core cost on all core jobs. The same reasoning and method of computation would apply to molding and cleaning to arrive at logical estimated costs per pound that would recover in selling price the total producing cost.

The cost per pound, which is developed from the general or miscellaneous payroll, would not be subject to the job variation; part of this cost might be of a fixed nature and, therefore, only affected by volume.

If this practice were followed, it is certain that the profit structure of the industry and of the individual operators will improve to a marked degree.

Expense Items: Included under this general heading are all other elements not covered in Sections 2 and 3. As all labor items are covered in Section 3 under the payroll, all entries to this classification will come from purchases, and as in the direct materials will be identified by an assigned account number.

In this classification, it was deemed necessary to carry only two subdivisions —Melting and All Other Supplies and Expenses. A proposed form (Exhibit J) is suggested as the collecting media for this distribution and the chart of accounts explains the entries to go into each classification.

From the illustration given in Exhibit "J" the total of these expenses for the month are $445.00, distributed $160.00 to Melting and $285.00 to All Other Supplies and Expenses.

Taking the melting expense and converting to a pound cost, we develop on the basis of good casting shipped (returns deducted) a cost of 1.79c per pound. Our metal cost, therefore, changes again by this conversion.

Instead of using invoice cost or $13.00 per cwt., as we have been assuming throughout this discussion, it in reality is $16.97 per cwt as the basis on which loss in melt should be computed.

The other developed cost of 3.18c per lb will be made up of many items. Some of these will be fixed, and whether it is a high or low cost per pound on these items will depend entirely on volume. The majority of the supply expense will be rather constant to production in cost per pound. Consequently, the cost will show great fluctuation monthly, and the safest method would be to use a figure developed over a long period of operation as a standard or one sufficiently high to assure proper coverage.

(*To be concluded next issue*)

Seeks Questions on Refractories

Refractories Division of the AFA is seeking questions which foundrymen would like to have answered on the subject of refractories at the coming national convention in Cleveland. One of the program features of the refractories session will be a "Question and Answer" panel for an "Information Please" program. Charles S. Reed will act as moderator, with J. A. Bowers, A. S. Klopf, E. J. Carmody and R. H. Stone participating. Questions foundrymen would like to submit to the panel should be sent in now to the division chairman, C. E. Bales, Box 124, Ironton, O.

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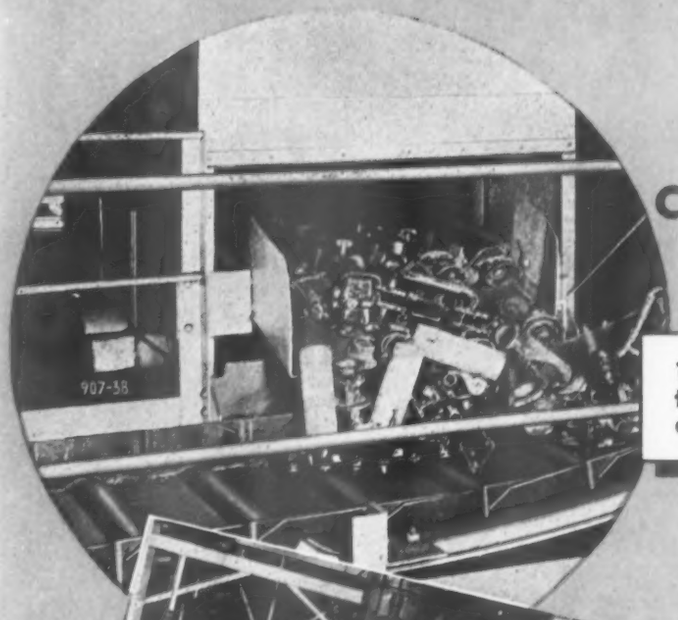
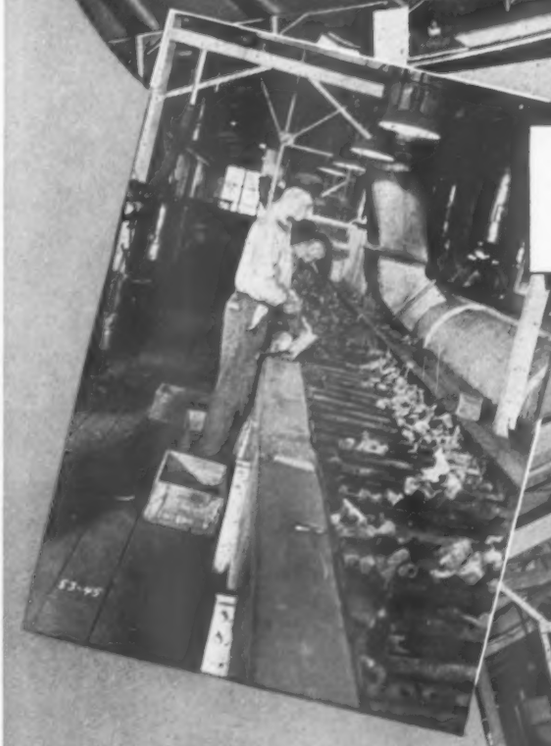
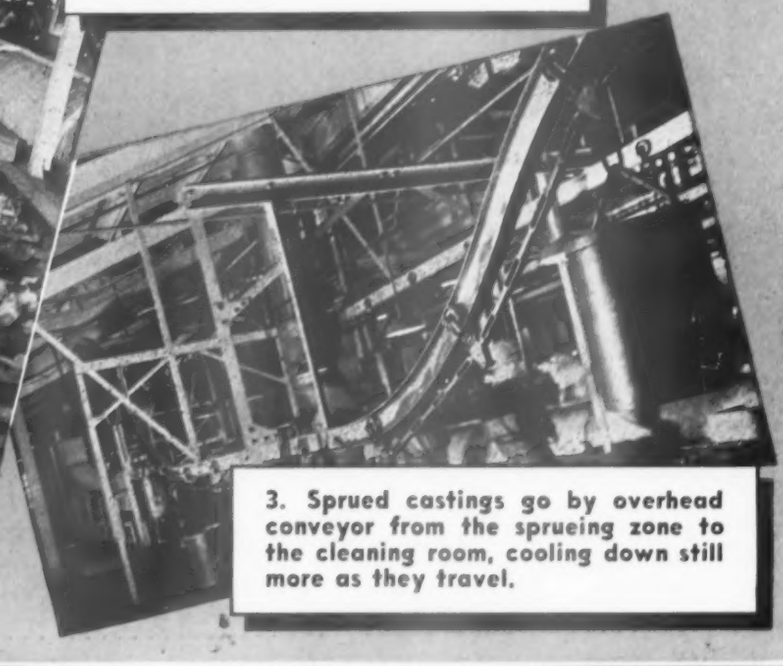
BETTER CASTING HANDLING EQUIPMENT



1. Hot castings are discharged from the shake-out machine to an apron cooling conveyor.



2. As castings cool down they are sprued and sorted on this apron. Remelt is left on conveyor going to charging zone.



3. Sprued castings go by overhead conveyor from the sprueing zone to the cleaning room, cooling down still more as they travel.

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A GLOSSARY OF TERMS EMPLOYED IN THE FOUNDRY

Continued from the February Issue

FERROSILICON—An alloy of iron and silicon available in several grades containing from 14 to 20 per cent silicon, 42.5 to 52 per cent silicon, 69.5 to 82 per cent silicon, 82 to 88 per cent silicon, and 88 to 95 per cent silicon.

FERROTITANIUM—An alloy of iron and titanium available in several grades containing from 17 to 38 per cent titanium.

FERROTUNGSTEN—An alloy of iron and tungsten containing about 80 per cent tungsten.

FERROVANADIUM—An alloy of iron and vanadium containing 35 to 40 per cent vanadium.

FETTLING DOOR—A door through which the bottom of a furnace is repaired. (British).

FILLER—Material used to fill defective places in castings.

FILLET—A concave junction formed where two surfaces meet by use of a preformed strip of leather or wax.

FILLING FRAME—Placed on top of a flask to hold an extra quantity of sand while the mold is being rammed on a machine.

FILTER, AIR—A device inserted in an air stream to remove dust and dirt by obstructing their passage.

FIN—A thin piece of metal projecting from a casting at the parting line or at the junction of cores, or of cores and mold, etc.

FINISH (VERB)—The hand work on a mold after the pattern has been withdrawn.

FINISH (MACHINE)—Amount of metal allowed for machining.

FIREBRICK—Brick made of refractory clay or other material which will resist high temperatures.

FIRECLAY—A type of clay which is resistant to high temperatures.

FIRESTONE—A type of refractory rock (mica schist) used for lining cupolas and other types of furnaces.

FIRE SAND—A refractory sand which resists high temperatures.

FLAME HARDENING—Process of heating the surface of a casting to a high temperature with a flame and then quenching.

FLASK—Container in which a mold is made.

FLASK, SLIP—A removable flask to be stripped vertically from the mold.

FLASK, SNAP—A hinged flask can be removed from the mold after completion.

FLASK, TIGHT—Flask remains on the mold.

FLASK PINS—Assure proper alignment of cope and drag molds after the pattern is withdrawn.

FLAT RAMMER—See butt rammer.

FLOOR SAND—Backing sand.

FLUX—Any substance used to promote fusion. Also any material which reduces, oxidizes or decomposes impurities so that they are carried off as slags or gases.

FOLLOW BOARD—Board shaped to fit the pattern and form the joint.

FOREHEARTH—Brick lined reservoir in front of the cupola.

FOUNDRY NAILS—See nails.

FLUORSPAR—Commercial grade of calcium fluoride.

GAGGER (JAGGER)—An L-shaped rod used for reinforcing sand in the cope mold.

GALVANIZING EMBRITTLEMENT—Brittleness caused by cooling malleable iron quickly from a temperature of 800 to 900°F.

GAMMA IRON—One of the allotropic (polymorphic) forms of iron which crystallizes in the face-centered cubic lattice form. Its range of stability when pure is 2552 to 1670°F.

GANGWAY—Passage way in a foundry.

GANISTER—A highly siliceous sandstone used as a refractory particularly for furnace linings.

GATE—Specifically, the point where molten metal enters the casting cavity. Sometimes employed as a general term to indicate the entire assembly of connected columns and channels carrying the metal from the top of the mold to that part forming the casting cavity proper. Term also applied to the pattern parts which form the passages, or to the metal that fills them.

GATED PATTERNS—One or more patterns with gating systems attached.

GLOVES, SAFETY AND INDUSTRIAL—Gloves made of leather, asbestos, rubber or other suitable material which may additionally be metal faced for the protection of the hands against cuts, heat, acids, etc.

GOGGLES—See eye shield.

GRAINS—Crystals in metals and alloys.

GRANULAR PEARLITE—A structure formed from ordinary lamellar pearlite by long annealing at a temperature below but near to the critical point, causing the cementite to spheroidize in a ferrite matrix.

GRAPHITE—Native carbon in hexagonal crystals, also foliated or granular massive, of black color with metallic luster and soft. Used for crucibles, foundry facings, lubricant, etc. Also made artificially by passing alternating current through a mixture of petroleum coke and coal tar pitch.

GRAPHITIZATION—The decomposition of carbide to give free carbon as graphite or as temper carbon.

GREEN SAND—Prepared molding sand in the moist or "as-mixed" condition.

GRID—See arbor or crab.

GRINDER—A machine on which a grinding wheel is mounted.

GRINDING—Removing gate stubs, fins and other projections on castings by an abrasive wheel.

This is the fourth installment of an extensive glossary of foundry terms compiled by Edwin Bremer from a wide variety of sources. In the development of this material a great amount of help has been secured from the *Steel Castings Handbook* published by the Steel Founders' Society of America, Cleveland; *American Malleable Iron* published by the Malleable Founders' Society, Cleveland, and from unpublished work of a Committee on Foundry Nomenclature of the American Foundrymen's Association, Chicago. THE FOUNDRY wishes to thank all sources from which this material has been obtained.

THE EDITORS

A GLOSSARY OF TERMS EMPLOYED IN THE FOUNDRY

GRINDING WHEEL—Abrasive materials such as silicon carbide, aluminum oxide, corundum, emery, etc., which are bonded with clays, rubber, synthetic resins and formed into wheels under pressure. The wheels then are vitrified or baked depending upon the bond.

GRINDING WHEEL DRESSER—A device for truing the face of, or forming a contour on the face of a grinding wheel.

GRIT, ABRASIVE—Crushed ferrous or synthetic abrasive material in various mesh sizes which is used in abrasive blasting equipment for cleaning of castings.

GUIDE—The strip or other suitable device used to locate the cope in the proper place on the drag.

GUIDE PIN—The pin used to locate the cope in the proper place on the drag.

HALLOYSITE—A massive, clay-like or earthy material with conchoidal fracture and often resembles unglazed porcelain. It is isotropic; *n*, 1.470-1.542 (Larsen); cleavage, none; hardness, 1-2; specific gravity, 2-2.2; luster, pearly to waxy or dull; color, white, grayish, yellowish and reddish. Used as a bond in certain types of green sand molding.

HAND LADLE OR SHANK—A small ladle carried by one man.

HARD SAND MATCH (MATCHPLATE)—A body of sand shaped to conform to the parting line upon which a pattern is laid in starting to make a mold. Sand is made hard by addition of linseed oil and litharge, portland cement, etc. See match.

HEAP SAND—Sand on piles on the foundry floor.

HEAT TREATMENT—An operation or combination of operations involving the heating and cooling of a metal or alloy in the solid state for the purpose of obtaining certain desirable conditions or properties.

HINDERED CONTRACTION—The prevention of the free contraction of a metal or alloy by mold conditions or casting design.

HOMOGENIZE—A prolonged heating to correct by diffusion, the microsegregation of constituents.

HOT SPOTS—Localized areas of a mold or casting where high temperatures are reached and maintained for a period of time.

HOT SPRUING—Removing castings from gates before the metal has completely solidified. The operation is particularly necessary on light-section or intricate castings which might be cracked if removed in the cold state.

HOT TEARS—Cracks in castings formed at elevated temperatures; usually by contraction stresses.

HYDRAULIC CLEANING EQUIPMENT—Casting cleaning equipment in which the removal of sand and other extraneous material is accomplished through high pressure water streams which may or may not carry sand in suspension.

HYPEREUTECTOID—An alloy containing more than the eutectoid composition.

HYPOEUTECTOID—An alloy containing less than the eutectoid composition.

HYSTERESIS LOSS—Magnetic energy lost through development of heat in carrying a magnetic material through a complete cycle of magnetization, no matter how slowly.

INGOT—Commercial pig or block in which copper, copper-base, aluminum, aluminum alloys, magnesium, magnesium alloys, and other nonferrous materials is made available to the foundry field.

INOCULATION—A process of adding some material to molten gray cast iron in the ladle for the purpose of controlling the structure to an extent not possible by control of chemical analysis and other normal variables.

IMPACT TEST—A test in which one or more blows are applied suddenly to a specimen. Results usually are expressed in terms of energy absorbed or number of blows (of a given intensity) required to break the specimen. Izod impact or Charpy impact are the common methods of studying impact resistance.

IMPREGNATION—A process for salvaging leaky castings by injecting under pressure liquid synthetic resins, tung oil, etc., into the porous area which is solidified in place by heating or baking.

INCLUSIONS—Particles of slag, sand or other impurities such as oxides, sulphides, silicates, etc., trapped mechanically during solidification or formed by subsequent reaction of the solid metal.

INDUCTION FURNACE—A melting unit wherein the metal charge is melted electrically by induction.

INTERNAL STRESS—A system of balanced forces existing within a casting not subjected to a working load.

IRON CEMENT—An intimate mixture of finely divided iron and sal ammoniac which when moistened with water forms a paste or putty and later hardens to a solid mass.

IRON, MALLEABLE—A mixture of iron and carbon including smaller amounts of silicon, manganese, phosphorus and sulphur, converted structurally by heat treatment into a matrix of ferrite containing nodules of temper carbon.

IRON, WHITE OR HARD—Iron of suitable composition in which the castings, later to be malleablized, are originally cast. Carbon is in the combined form; hence its white fracture and name.

JACK STAR—A piece of hard metal for use in a tumbling barrel.

JACKET, MOLD—A wood or metal form slipped over a mold made in a snap or slip flask, to support the four sides of the mold during pouring. Jackets and mold weights are shifted from one row of molds to another during the pouring period.

JACKET, SLIP—See jacket, mold.

JAGGER—See gagger.

JARRING MACHINE—Molding machine which rams the sand by rapid jolting.

JET—A small stream of liquid or gas. Also an abbreviation of jet bar.

JET BAR—A small bar extending below the surface of the cope. See chuck.

JOLTER—See bumper.

KILLED STEEL—Molten steel held in a ladle, furnace or crucible (and usually treated with aluminum, silicon or manganese) until more gas is evolved and the metal is perfectly quiet.

KISH—Graphite thrown out by liquid cast iron in cooling.

(To Be Continued)

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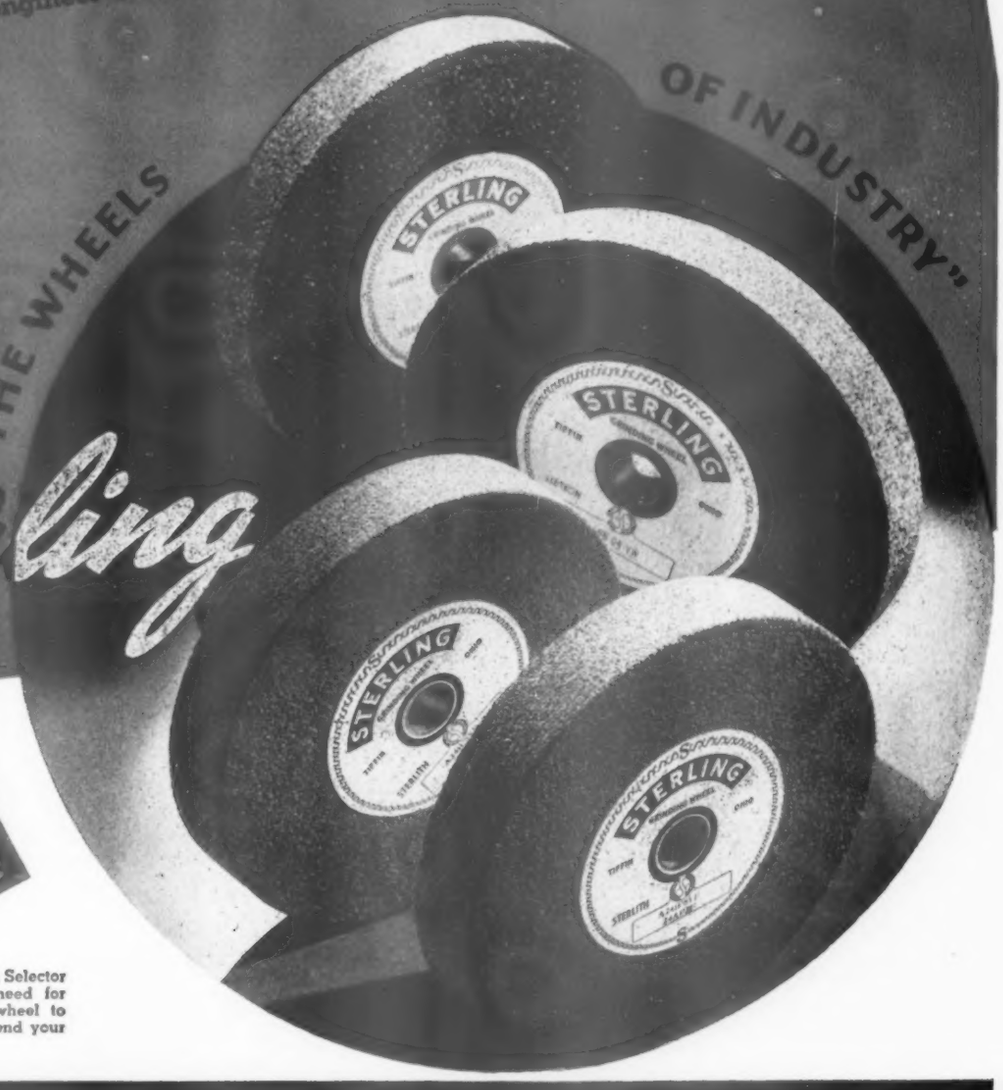

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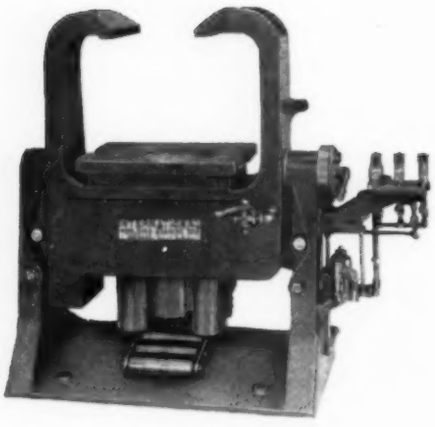

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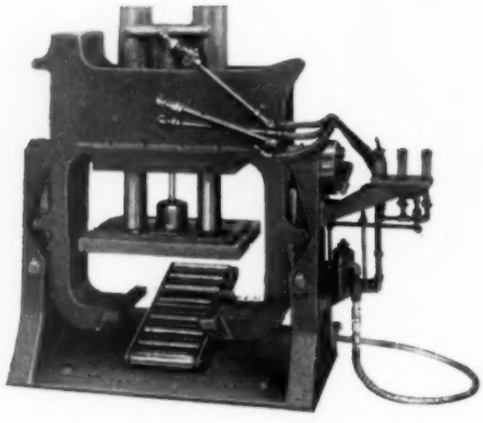

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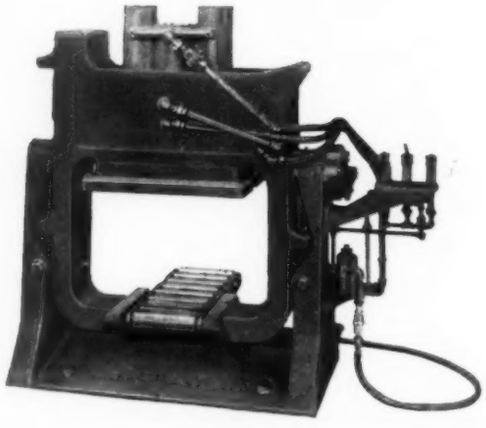

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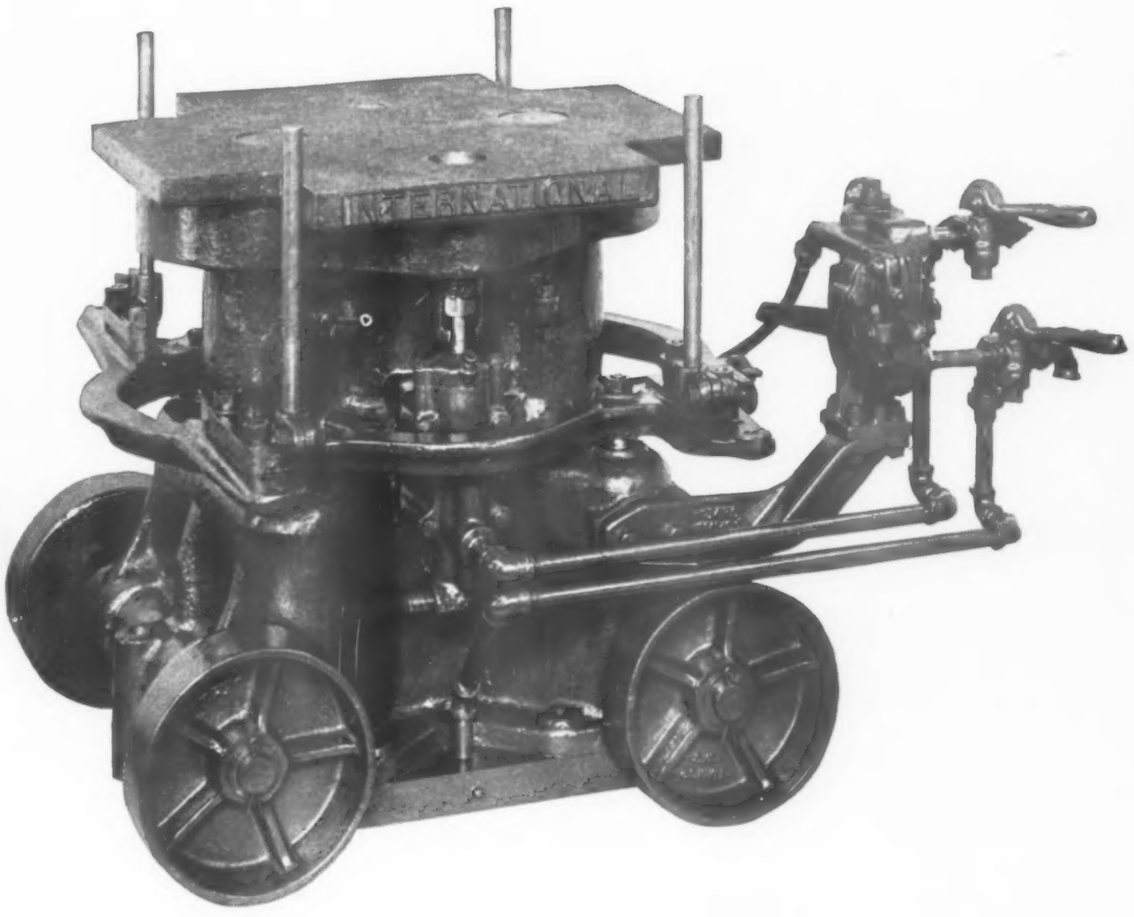
INTERNATIONAL
MOLDING MACHINES

Type JDP



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OBITUARY

S WELLS UTLEY, 66, president, Detroit Steel Casting Co., Detroit, died in that city, Feb. 13, of a heart attack. Mr. Utley was born in Pontiac, Mich., June 25, 1879, and received his education in the public schools of Detroit and the University of Michigan. Shortly after he was graduated from the university in 1902 with an A.B. degree, he entered the employ of the American Radiator Co., Detroit. Three years later he became connected with the Detroit Steel Casting Co. as cost clerk, and since that time became successively purchasing agent, assistant secretary, secretary, vice president and general manager, and president.

Over a period of many years Mr. Utley rendered most valuable service to many foundry associations and was one of the best known figures in the steel foundry industry. He was a past president of the American Foundrymen's Association, a past president of the National Founders' Association, and was active in the affairs of the Steel Founders' Society of America. Mr. Utley was a leader in many civic and business groups, and was a past president of the Employers' Association of Detroit, the Detroit Board of Commerce and the Michigan Manufacturers' Association. He was a delegate to the International Foundry Congress in London in 1929.

• • •

Joseph R. Dunbeck, 81, general foundry superintendent of Symington-Gould Corp., Rochester, N. Y., at the time of his retirement in 1929, died Jan. 26, in Buffalo. Mr. Dunbeck entered the foundry industry as a young boy at Walker Foundry Co., Erie, Pa. Later he worked for Gould Coupler Co., Depew, N. Y., Pratt & Letchworth Co., Buffalo, and other malleable foundries. He joined Symington-Gould Corp. in 1913.

• • •

Paul M. Potter, 57, president of Potter & Rayfield Inc., Atlanta, died Jan. 1, in that city. Mr. Potter, following an association with the Cleveland Lamp Co., Kansas City and St. Joseph, Mo., went to Atlanta in 1917, where he and F. H. Rayfield founded Potter & Rayfield Inc.

• • •

Rupert A. Nourse, 72, chairman of the Midland Co., Milwaukee, and formerly identified with what is now the Wisconsin Appleton Co., that city, died in Milwaukee, Jan. 21. Mr. Nourse at one time was active in the Malleable Founders' Society.

• • •

Samuel J. Simmons, 64, formerly assistant general sales manager in the Pittsburgh office of the Aluminum Co. of America, until his retirement in 1944, died Jan. 25, in Unionville, O. Mr. Simmons joined the company in 1913 as a general salesman, and later held positions as manager in Cleveland, Buffalo, New York and South America.

• • •

James P. Allen, 74, for many years prominent in the steel casting industry, died in Pittsburgh, Jan. 23. A former president of the Union Steel Casting Co., Pittsburgh, he was associated with that company from 1902 until 1929, and later was identified with Machined Steel Castings Co., Alliance, O. Mr. Allen served as president of the Steel Founders' Society of America from 1923 to 1926.

• • •

Robin Pulling, 60, founder and operator of the Pulling Foundry, Columbus, O., died Jan. 22 in that city. Mr. Pulling was also president and treasurer of the Columbus Steam Pump Co. A lifelong resident of Columbus, he attended Ohio State University before entering the foundry industry.

• • •

Charles Lange, 82, one of the founders of the Buckeye Foundry Co., Cincinnati, died Jan. 23, at his home in that city, following an illness of two years. Mr. Lange, a native of Germany, went to Cincinnati at the age of 18.

• • •

Arthur C. Obrock, 62, treasurer of the American Foundry & Mfg. Co., St. Louis, died Jan. 29 in that city.

• • •

Harry F. Davis, 55, field engineer for the Mathews Conveyer Co., Ellwood City, Pa., died Jan. 27, at his home in Drexel Hill, Pa. Mr. Davis was associated with the company for 26 years, with headquarters in Philadelphia. During that time he engineered many outstanding conveyor systems throughout the extensive territory in which he operated.

HARRY F. DAVIS

Congress Program Is Nearing Completion

(*Concluded from page* 96)

lurgical type. A feature will be a breakfast session similar to the one held several years ago.

Applications received for display space at the Foundry Show assure one of the largest and most comprehensive exhibits of foundry equipment and supplies ever held in conjunction with an AFA convention. A number of new and improved products will be shown, and much of the equipment will be displayed in actual operation.

Assignment of hotel rooms for the convention week has been started by the Official AFA Housing Bureau, 1604 Terminal Tower, Cleveland 13. All applications for accommodations are being handled by this bureau.

TENTATIVE SCHEDULE OF SESSIONS

Monday, May 6

10 a.m.—Opening session. Exhibits open.
12 p.m.—Aluminum and magnesium round table.
4 p.m.—Lecture course session—(1).
8 p.m.—(a) Sand shop course—(1).
(b) Joint meeting, plant equipment and hygiene.
(c) Aluminum and magnesium.

Tuesday, May 7

10 a.m.—(a) Malleable foundry practice.
(b) Aluminum and magnesium session.
(c) Inspection of castings.
12 p.m.—Luncheon—Engineering school alumni groups.
2 to 10 p.m.—Northeastern Ohio Day.
2 p.m.—(a) Inspection of castings.
(b) Refractories.
(c) Malleable foundry practice.
4 p.m.—(a) Aluminum and magnesium.
(b) Lecture course session—(2).
7 p.m.—Chapter officers and directors dinner.
8 p.m.—(a) Refractories.
(b) Sand shop course—(2).

Wednesday, May 8

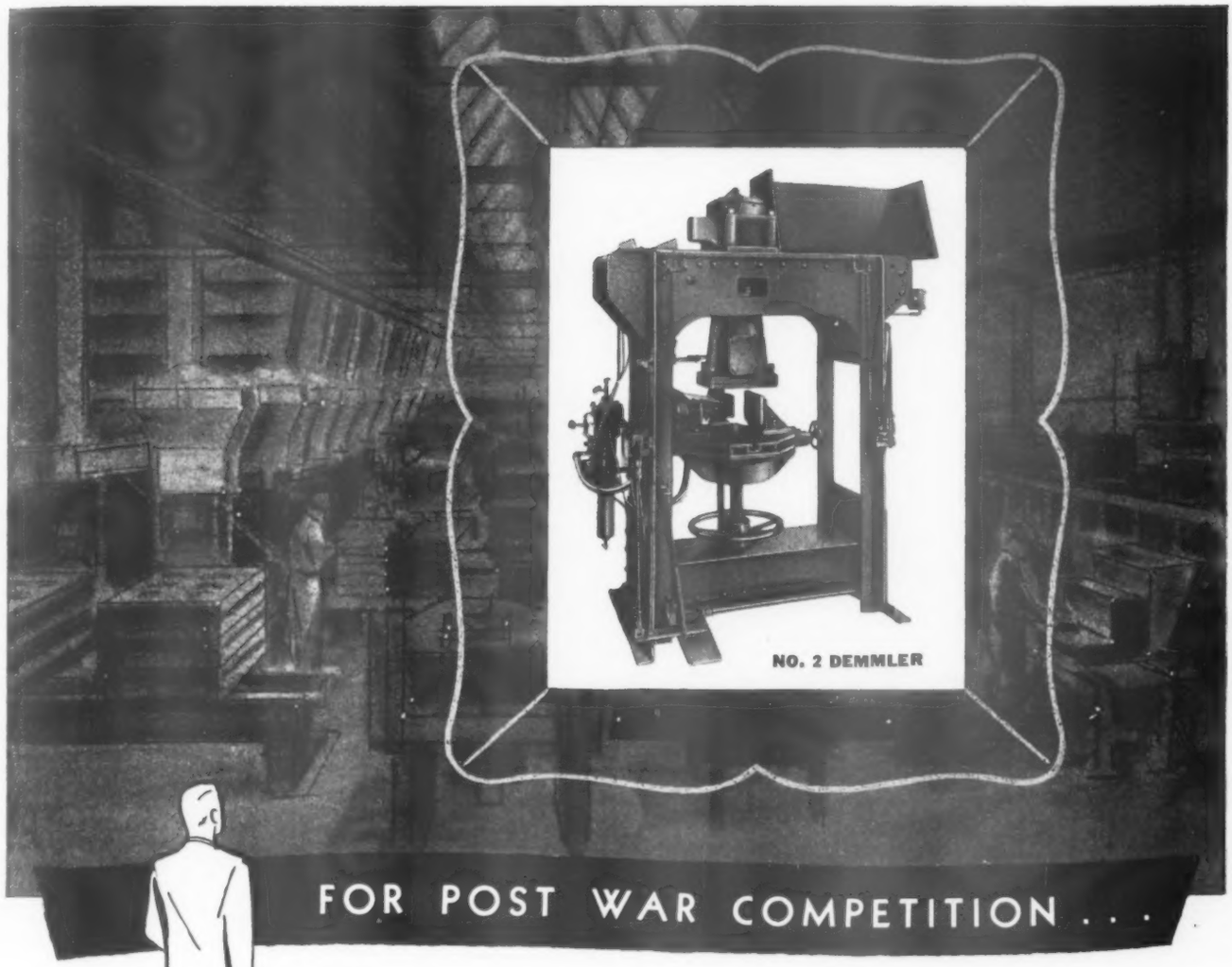
10 a.m.—(a) Malleable foundry practice.
(b) Brass and bronze.
(c) Sand research.
(d) Gray iron.
12 p.m.—(a) Brass and bronze round table luncheon.
(b) Malleable round table luncheon.
2 p.m.—Sand research.
4 p.m.—(a) Sand shop course—(3).
(b) Lecture course session—(3).
7 p.m.—Foundry instructors' dinner.
8 p.m.—(a) Foreman training.
(b) Engineering Student training.

Thursday, May 9

9 a.m.—Annual business meeting.
12 p.m.—Steel round table luncheon.
2 p.m.—(a) Brass and bronze.
(b) Patternmaking.
(c) Gray iron.
(d) Steel.
4 p.m.—(a) Foundry costs.
(b) Apprentice training.
(c) Lecture course session—(4).
(d) Gray iron.
7 p.m.—Alumni dinner.
8 p.m.—(a) Sand shop course—(4).
(b) Job evaluation and time study.
(c) Apprentice training.

Friday, May 10

9 a.m.—Sand shop course—(5).
10 a.m.—(a) Gray iron.
(b) Steel.
(c) Job evaluation and time study.
2 p.m.—(a) Steel.
(b) Gray iron.
(c) Brass and bronze.
4 p.m.—Lecture course session—(5).
5 p.m.—Exhibits officially close.
7 p.m.—Annual dinner.



FOR POST WAR COMPETITION . . .

PICTURE THIS IN YOUR FOUNDRY!

. . . . . and there is always a place in your picture for a Demmler Core Blowing Machine, particularly the DEMMLER No. 2.

Carefully designed for profitable use on a wide variety of core blowing jobs, the No. 2 DEMMLER Core Blowing Machine produces quality cores at a high rate of speed with maximum economy.

The No. 2 DEMMLER is unequalled for core work as applied to pipe fittings up to three inch size, automobile malleable and gray iron castings, agricultural machinery casting and similar work.

This machine possesses all the refinements born of years of experience in building core blowing machines, and WM. DEMMLER & BROS. have been building core blowers since 1911—were the first in the field.

Meet post-war competition by installing the No. 2 DEMMLER Core Blowing Machine. There is none more efficient or economical than a No. 2 DEMMLER.

Specification Sheet Sent On Request

Wm. DEMMLER *& Bros*

Kewanee, Illinois

MANUFACTURERS OF CORE BLOWERS EXCLUSIVELY SINCE 1911

CORE BLOWING PRACTICE

(*Continued from page* 95)

and goes out through the blowhole at the bottom, but all the sand never is removed. With 50 lb, the usual amount removed is 30 lb. With a single blowhole, the amount may not exceed 10 lb, enough for three or four blows, but it means a decided loss of time in refilling the magazine so frequently. Piping is inevitable and must be anticipated.

The ideal container would have a pipe from the loading spot right down to the blowhole. For example, in a corebox with ten ¾-in. blowholes, the ideal magazine would be ten 1½-in. tubes, and this would move nearly all the sand. However, providing a special container for every job is an expensive process, and the average foundryman must have something he can rig for several jobs in the run of a day, something he can change in a hurry. A core blower can be rigged for quick changes.

The general impression is that core blowers are applicable only to long-run jobs, but this is a mistake. As high as 27 changes have been made in a core blower in a single day. In one plant in the Middle West the men are allowed 5 minutes to make a change. If they take more than 5 minutes, it is on their own time. In many instances where the rigging is not elaborate, the change is made in 2 minutes. With standardized box sizes and only a few changes necessary, the operator easily and quickly can change the blow plates without any appreciable loss of time.

Many men are timid in starting to use a core blowing machine; they are afraid someone is going to be injured. In the author's first experience with a core blowing machine he was covered from head to foot in a huge leather apron. Today in a certain Middle West shop, the operator is too lazy to plug a hole; he places a finger over the hole and blows the sand against it.

One type of machine, known as the diaphragm type, is designed for use with coreboxes split vertically. In this type the magazine moves. A second machine is the draw type, where loose pieces can be placed in the corebox and air blown in. When the machine is used without dryers, the plate is run in at the front, then drawn out and placed on the core rack. An interesting feature is double plate venting through a row of small holes on the side. Air is blown through two plates instead of the usual single plate, and the bottom plate is filled with vent holes. All the air in the corebox is brought up through the plate and out through the holes. The method has proved of remarkable advantage on piston cores and other cores of a like general character. Where a box has few vents the air is taken right out through the side of the vent plate. The great number of holes in the plate leave little spots on the core, but usually they can be arranged on areas that do not show on the casting. On another machine the core is placed in an aluminum dryer and rolled over. An interesting feature during the war was that no aluminum was available for core plates but the foundryman could get aluminum dryer shells. The shell is clamped to the machine and the core is rolled over in shell support.

When loose pieces are in the corebox, it is necessary to provide a series of vents behind the pieces, otherwise the fines in the sand will enter and jam them. This feature frequently is overlooked. In addition to allowing the fines to escape through the vents, the precaution insures a more open or permeable core. In another type of box a number of inserts or plugs are placed all along one side.

In a steel foundry a ½-in. plate is clamped in place to hold in the sand. Once in a while the sand blows through, at which time a patch is welded over the hole. In this instance the air pressure was 110 psi, entirely too high for the job and the manner in which the box was vented. However, the plate, ½ x 8 x 12-in., lasted about a week and no changes were made. In another instance, where the sand is blown through six 1½-in. blowholes to form a 62-lb core, the corebox turned out over 200,000 cores.

Place Stool Under Corebox

In a gray iron foundry where the core is blown over the length of the magazine, a stool is placed under the corebox to limit the vertical travel of the draw cylinder. A slot on the stool matches the corebox and a suitable stop locates it in place. All the coreboxes in this particular shop are reinforced on the bottom with a ½ x 1¼-in. steel plate. On another type of machine the loose plate slides into the guide. The guides are designed to bring the center of the box under the center of the magazine. In some instances it is advisable to place a steel plate under the blowhole.

Substantially-made hard wood coreboxes may be used on a coreblowing machine. The box further is reinforced with rods and with plates on the sides. Vents are needed in back drafted pockets, with all the vents coming out the side of the plate. The plate may be 1-in. plywood, used in connection with the master blow plate on the machine. This plywood plate comes up and closes all the holes in the other plate, except those that are needed for any particular job. With this arrangement a number of jobs may be mounted by matching the blowholes. A machine of this kind is capable of blowing cores in weight up to 200 lb. The blowhole in the plywood is a steel or cast iron bushing.

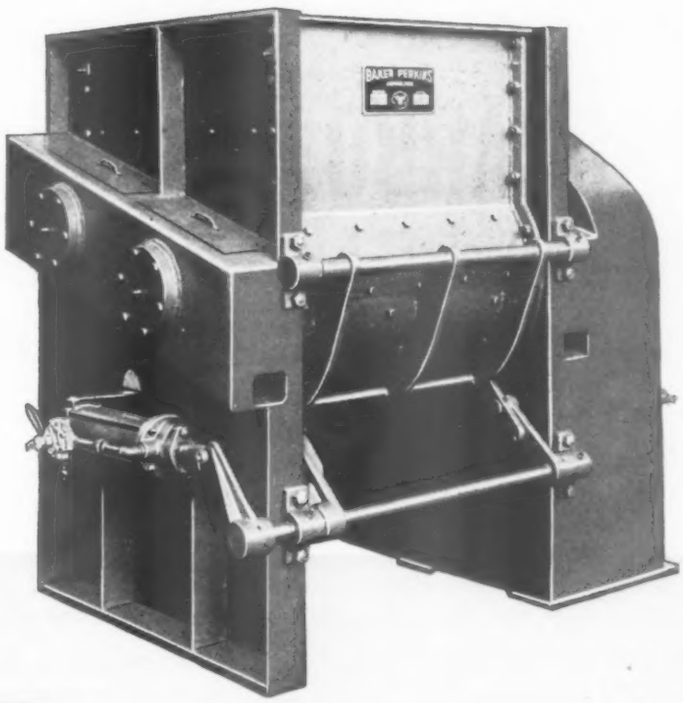
One of the main advantages of the core blowing machine is that the number of reinforcing rods or wires in the core may be reduced, in some instances eliminated. In one plant where 27 boxes are in use, one man operates the machine while four men draw the cores. The boxes are rigged up on a shelf, and when the re-

(*Concluded on page* 171)

RECONVERSION PROBLEMS: Addressing open letters to President Truman calling attention to reconversion problems and offering suggestions for their solution, members of the National Conference of Business Paper Editors are shown as they spoke over the Columbia Broadcasting System, Jan. 11. Speakers were, left to right, Edward G. Gavin, *American Builder;* Frank G. Steinebach, THE FOUNDRY, who told of the price squeeze and labor shortages retarding the foundry industry; Paul Wooten, president of the National Conference; Stuart Heinritz, *Purchasing,* and Godfrey Lebhar, *Chain Store Age*

WHAT THEY SAY ABOUT BAKER PERKINS CORE SAND MIXERS

MEMBER



Workmen who operate them like the simple, labor-saving operation of Baker Perkins "Unidor" Core Sand Mixers. Baker Perkins Mixers mull, stir, and knead all in one operation, and they do not require any special aerating attachments. Result? They consistently produce sand batches of uniformly high quality with a minimum of labor.

Production Men rely on Baker Perkins "Unidor" Mixers because their swift action in preparing core sand gets any job of casting off to a flying start. They help assure uninterrupted foundry production because they deliver a thorough, homogeneous sand mix of greater permeability which improves casting quality and reduces chances of spoilage. "Unidor" Mixers can be loaded by weighing hoppers or power skip-hoists to suit the production set-up.

Foundry Managers endorse Baker Perkins "Unidor" Mixers because their high operating efficiency means a savings in production costs without sacrificing casting quality. "Unidor" Mixers distribute uniformly a thin layer of bond around each of the sand grains, assuring 100% benefit from the bonds, binders, oils, seal coals, pitch, or other compounds used. "Unidor" Mixers require practically no maintenance other than routine lubrication and occasional renewal of easily replacable steel liners and hardened steel wearing shoes. For further facts call or write Baker Perkins Inc., Foundry Equipment Sales Division, Saginaw, Michigan.

BAKER PERKINS BUILDS EFFICIENT FOUNDRY EQUIPMENT

FERROCARBO Briquettes

reduce "leaker" losses by effectively inoculating and deoxidizing cast iron

A MARKED exothermic reaction results from the very thorough deoxidation that follows the use of FERROCARBO briquettes. This gives a highly fluid metal which flows easily and freely into every part of the mold.

Too, the controlled deoxidation and inoculation effected by FERROCARBO briquettes in the cupola provides prolonged fluidity at lower temperatures. This feature is particularly noticeable in the metal last poured from the ladle. Sound castings, free from "leakers," are secured over the entire heat.

Superior quality iron that is readily machinable is also insured by the use of FERROCARBO briquettes. They cause a noted decrease in segregation and insure uniform distribution of the iron's various constituents, thus providing a much improved structure free from hard spots and areas of weakness.

All these factors combine to produce a striking decrease in "leaker" losses and similar defects. At the same time quality iron of superior structure and ready machinability is procured. Marked operating economies are thereby effected.

Case histories dealing with the reduction of "leakers" in cast iron treated with FERROCARBO briquettes will be gladly furnished by our metallurgists. For complete information, write Dept. L-36, The Carborundum Company, Refractories Division, Perth Amboy, New Jersey.

FERROCARBO Briquettes

BY CARBORUNDUM

TRADE MARK

FERROCARBO Distributors: Kerchner, Marshall & Co., Pittsburgh, Cleveland and Birmingham; Miller and Company, Chicago, St. Louis and Cincinnati

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(*Concluded from page* 168)

quired number of cores has been made in one box, it is replaced by another. Coreboxes and dryers are aluminum.

What probably is the longest core to date is 54 in. in length, made in a 59-in. corebox. It is blown through four ⅝-in. blowholes from a 24-in. long magazine. The box has been in constant use for 7 years for a production of 200 cores per day and never has been back in the patternshop for repair.

Following is a resume of questions frequently asked the author on matters relating to core blowing, together with their answers:

Q—With a vent hole behind a pocket, a sandblast action is set up that quickly destroys the loose piece. How is that prevented?

A—A piece of hardened steel is placed at the spot.

Q—Is there any relation between the area of the blowholes and the area of the vents?

A—Up to the present that is still a debatable point. One man claimed his ratio was 4 to 1. For 1-in. blowhole he had four 1-in. vents. Actual examination showed the ratio on one job was 10 to 1, while on another job it was 1 to 1.

Q—Have the coreblowing experts developed any rule on this ratio feature?

A—In an attempt to develop something along that line experiment was tried with a bushing core 4½ in. diameter, 20 in. in length. Starting with 20 vents, the number gradually was increased to 300 without showing any change. The ideal corebox would be made of wire screen but that, of course, is impossible. In other words, the more vents the better.

Q—How are the vents opened after a corebox has been out of service for some time?

A—Put in new ones. All boxes should be cleaned thoroughly when they come off the blower. Several proprietary compositions are on the market. In many places the coreboxes are placed in a kerosene bath.

Q—How are the vents prevented from clogging all the time?

A—Probably something in the core sand mixture has to change.

Q—Can molding sand be blown?

A—Properly prepared molding sand readily may be blown. Binder and moisture content must be watched and regulated carefully.

Q—Is the flowability an important factor and how is it determined?

A—Flowability is an important factor and may be determined by the standard method and equipment developed by H. W. Dietert, Detroit. The sand should be driven into the corebox as fast as possible, if for no other reason than to prevent cutting of the box. A steel foundry in Chicago is blowing cores from a miscellaneous and nondescript mixture of one third crude silica sand, and the remainder broken cores, floor sweepings and old sand. The latest corebox has been in constant service for 9 months producing 3000 cores per day. Sand entering through five 1½-in. diameter blowholes fills the box instantly.

Q—Why is it claimed that blown cores are better than cores rammed in another manner?

A—Because the blown core is more evenly rammed. High permeability is insured without all the artificial venting required in a hand-rammed core, where part of the core is rammed solid, part is top rammed, and in some instances part is not rammed at all. Where cores are

unevenly rammed the metal will not lie against them properly; it will either dig into the soft parts, or boil and kick away from the hard parts.

Q—Has any data been compiled on the subject of baking time, or any difference in baking time between a blown and a rammed core?

A—A blown core will dry faster than a rammed core, owing to the fact that air is blown into the corebox with the sand. With the higher permeability, the heat will circulate through the core and dry it down to the core plate. Formerly it was considered necessary to use perforated core plates. Machine-blown cores are dried satisfactorily on plain composition plates.

Q—Have you had experience with sand sticking to the plate?

A—With certain core sand mixtures and moisture content it is possible.

Q—Is there not a tendency for the fines to migrate to the surface of the core?

A—Vents are designed to eliminate the fines. Fines travel to the edge of the box and a certain amount remains in the edge of the cores. The result is a core that is more porous in the center than at the surface. The moisture also stays in the center. On small cores, the moisture content must be kept down, otherwise the box cannot be filled. The moisture can be increased for blowholes ½-in. or more in diameter. Moisture is necessary to prevent the core from sagging. A sagging core indicates that the sand mixture is too weak. Probably 50 per cent of the cores blown today have a moisture content of at least 3 per cent, and in many instances up to 5, 6 and 7 per cent.

Q—How many men are needed to run the machine efficiently?

A—From one to five. In a Chicago shop with one man blowing and four men drawing, the output is 1000 cores per hour in a 16-hour day. The unit serves seven molding machines.

Q—Why are vents placed in the bottom of the corebox?

A—Vents in the bottom permit the air to go out and the sand to go in. Consider an easy illustration. Blow into a milk bottle and it quickly leaves the lips. Provide a hole in the bottle and there is no limit to the amount of air that is blown in. In certain types of coreboxes, bottom venting is not necessary. Before deciding whether bottom vents are necessary it is advisable to test the hardness of a core top and bottom. Experiment by the manufacturer indicates quite a difference in some instances and shows the necessity of providing bottom vents.

Editor's Note: This article is from a talk presented by the author before various chapters of the American Foundrymen's Association.

Preventing Surface Roughness

(*Concluded from page* 87)

methods.

1. Reduction of the ferrostatic head on the casting.

2. Increased mold hardness with ferrostatic head under 20 in. The possibility of buckle defects must be considered if the ramming is to be increased. Large flat casting surfaces may prevent the use of this method.

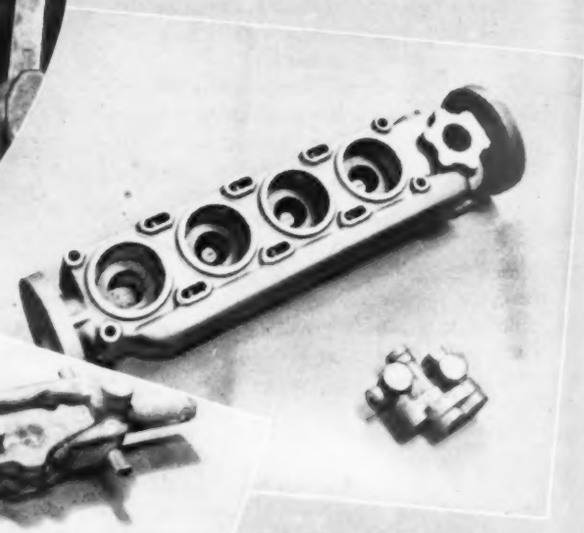
3. Blacking and skin drying the mold with ferrostatic heads over 20 in. It is possible on conveyor lines making castings with a high ferrostatic pressure in the drag and a low pressure in the cope to spray blacking in the drag only. The cope with a lower pressure can be rammed hard enough to avert metal penetration, but the drag with the highest pressure can be blackened in order to prevent penetration.

4. For thin-sectioned castings with low ferrostatic heads, the iron can be poured at low temperature. This method may cause difficulty from cold-shut formation and may not be applicable for this reason.

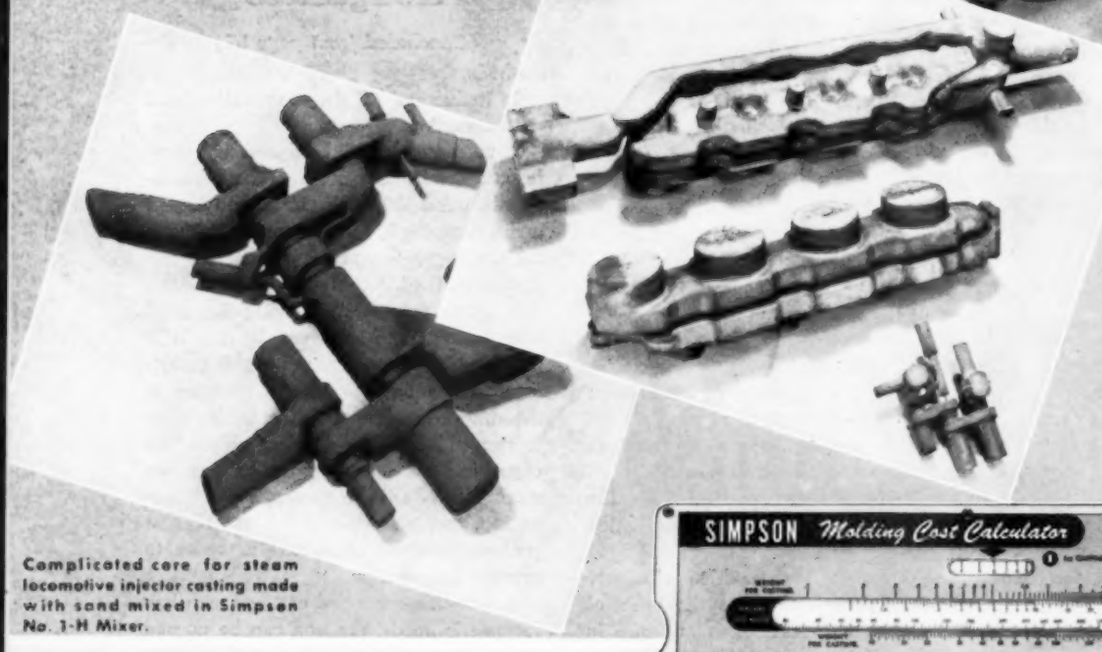
MAGNUS says: Better C

...with our SIMPSON N

● Left: Here, Mr. William M. Ball, foundry Superintendent of Magnus is inspecting a steam locomotive injector, machined and assembled ready for test. The photo, lower left, shows the difficult core assembly used for the injector body casting. The cores shown here are coated with "Ball-Cote," a special coating developed by Mr. Ball to meet rigid Navy requirements on lubricating system and filter castings. The coating gives castings an unusually smooth internal finish free of metal penetration and sand inclusions.



Oil filter head and injector core castings made from cores shown at left. They are clean and uniform.



Core assembly for oil filter head casting. Small core at bottom is an injector core for a coal sprinkler. Sand mixed in a No. 1-H. Finished castings are shown above.

Complicated core for steam locomotive injector casting made with sand mixed in Simpson No. 1-H Mixer.

IEW. The new Simpson Molding Cost Calculator shown at the ight is a handy tool for foundrymen. With it, one can almost intantly compute the molding cost per ton of good castings, the umber of molds to be made to produce a certain number of ood castings, how many pounds of iron will be needed to pour ll the remaining molds on a floor, and the cubic content of the old. This Calculator is free to foundrymen. Write for yours.

Cores..Better Castings..Reduced Costs

No. 1-H MIXER

MAGNUS BRASS DIVISION
OF NATIONAL LEAD COMPANY
533 READING ROAD • CINCINNATI 2 OHIO

January 29, 1946

Mr. Bruce L. Simpson, President
National Engineering Company
549 W. Washington Blvd.
Chicago, Illinois

Dear Mr. Simpson:

We would like to tell you of our experience with the No. 1, Model H, Simpson Intensive Mixer which we installed in our core room in May, 1945.

This machine replaced a paddle type mixer and as a result of the improved mixing performance we have been able to reduce the oil ratio from 24 ounces of core oil per 100 pounds of sand to 13 ounces per 100 pounds of sand.

In addition to this saving in oil since using the No. 1, Model H, Simpson Mixer, we have noticed much more satisfactory workability of the sand, reduced baking time, greater uniformity of our baked cores, less core breakage, and fewer casting defect losses.

The cores for our work are very complex and the type castings made require the utmost accuracy in our core practice.

Yours very truly,

MAGNUS BRASS DIVISION
of National Lead Company

B. I. Kaufmann
Manager

BIK:BM

THE results foundries are getting in the core room with Simpson No. 1-H Mixers are evident again in this letter from Magnus Metal Division, National Lead Co. Read it carefully. Mr. Kaufmann's words: "improved mixing performance," describe the simple reason why the No. 1-H reduces their core oil ratio; gives them better workability; reduces baking time and core breakage; assures greater uniformity; and reduces casting defects. That's why they like their Simpson. Wouldn't-you?

The No. 1-H was developed for better core sand preparation—and for use on molding sand in smaller foundries—if you want improved mixing ask a National Engineer to talk it over with you.

The National No. 1-H handles 4 to 5 cubic feet of sand without spillage. It offers top operating efficiency, medium capacity, economy and versatility. Built to the same high standards as the larger Simpson Mixers, it employs the same "mulling" principle of mixing. The 1-H has a dust enclosure, integral unit drive and motor, is designed for floor loading. Being portable, it is ideal for special as well as standard operations for side floor, core room or general molding. Write for bulletin.

NATIONAL ENGINEERING COMPANY

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Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

Activities of foundry GROUPS

St. Louis

REGULAR monthly meeting of the St. Louis District Chapter of the AFA was held Jan. 10, with 85 members and guests attending. Chairman Walter E. Illig presided and R. T. Leisk, chairman of the program committee, gave a brief resume of the February meeting and requested members to invite their executives and guests to attend. Walter Zeis, chairman of the membership committee, reported a membership of 215, with a loss of five members due to transfer to other chapters.

The chairman introduced the speaker, A. C. Denison, president of the Fulton Foundry & Machine Co., Cleveland, whose subject was "Castings Versus Weldments." Mr. Denison, who is also president of the Northeastern Ohio Chapter of the AFA, first extended greetings from that chapter, and gave a brief summary of the plans for the national convention to be held in Cleveland, May 6 to 10, which he urged all to attend.

Mr. Deninson gave an interesting discussion of the merits of castings, especially in the heavy machinery industry, emphasizing the following advantages: Rigidity; machinability without distortion; compression; wear resistance; dampening properties; heat resistance; corrosion resistance and lower cost of intricate design, especially where finish is necessary. Points of the discussion were emphasized by the use of slides.—*Lee H. Horneyer, secretary-treasurer.*

Reading

TECHNIQUES developed by the Navy for production of castings were explained to more than 60 members and guests of the Reading Foundrymen's Association, by Earl J. Bush, in charge of nonferrous foundry operations at the U. S. Navy Yard, Washington, at the Jan. 15 meeting held in the Berkshire Hotel.

"The speed of the reconversion program depends upon the foundry industry," Mr. Bush stated, adding that volume is needed immediately to get other industries started on full production. In describing castings for firing mechanisms of naval guns, he said that his foundry, which made numerous experiments, held to close dimensional tolerances in order to cut machining to a minimum and to speed production of vitally needed parts for ships under construction.

The speaker outlined techniques developed to avoid corrosion by salt water spray and firing, and said that all castings were made as light as possible to cut dead weight of a ship. In all nonferrous or steel castings he urged that proper design be the first consideration.

The following officers of the Reading Foundrymen's Association were elected for 1946: Robert P. Fritch, Union Bronze Co., Reading, Pa., president; Bruce W. Edris, Berks Foundry & Mfg. Co., Hamburg, Pa., vice president; Werner Finster, American Chain & Cable Co., Reading, treasurer; William I. Cassidy, 404 Berks Country Trust Bldg., Reading, secretary.

Members of the executive committee are as follows: E. J. Snell, Keystone Foundry Co., Reading; William M. Davies, Reading Foundry & Supply Co., Reading; Richard Henderson, Kutztown Foundry & Machine Co., Kutztown, Pa.; D. G. Burkert, Eastern Foundry Co., Boyertown, Pa.; E. K. Mark, Penn Foundry Co., Reading; Herman P. Good, Textile Machine Works, Wyomissing, Pa.; C. C. Mundell, Fairmount Foundry Inc., Hamburg; George W. Shomo, Confer Smith Inc., Hamburg.—*W. I. Cassidy, secretary.*

METROPOLITAN CHAPTER: Shown seated, left to right, at the annual Christmas party of the Metropolitan Chapter, AFA: Alexander McIntosh, Wright Aeronautical Corp., Paterson, N. J.; M. J. Hogan, Bierman-Everett Foundry Co., Irvington, N. J., and president, New Jersey Foundrymen's Association; Horace A. Deane, American Brake Shoe Co., and Metropolitan Chapter chairman. Standing: D. S. Yeomans, George F. Pettinos Inc., Philadelphia, entertainment committee chairman. (Photos on this and succeeding page courtesy George F. Pettinos Inc.)

New England

ANNUAL meeting of the New England Foundrymen's Association was held Jan. 9 at the Hotel Gardner, Boston, with over 300 members and guests in attendance. The meeting was also a celebration of the fiftieth anniversary of the association. An exellent steak dinner was served, followed by a fine entertainment. No speaker was scheduled for the evening.

The following officers were elected for the current year: B. W. Hagerman, Rice-Barton Corp., Worcester, Mass., president; D. L. Parker, General Electric Co., Lynn, Mass., vice president; Arthur W. Gibby, East Boston, Mass., treasurer; Ernest F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass., secretary. Members of the executive committee are: Arthur F. Dockery, H. & B. American Machine Co., Pawtucket, R. I.; Frederick M. Fitzgerald, Draper Corp., Hopedale, Mass.; Thomas I. Curtin Jr., Waltham Foundry Co., Waltham, Mass.; Thomas R. Walker, Warren Pipe Co.

(*Continued on page* 176)

MOGUL is a perfect Green Bond, which increases permeability in cores. Use MOGUL in cores for both green and dry strength.

MOGUL works with core oil because it decreases drying time and yields smooth cores. MOGUL works perfectly with pitch or rosin, too, because cores can be handled while still warm. MOGUL is widely used with sharp sands.

KORDEK

KORDEK is a perfect DRY BOND. It can be used in smaller quantities than most dry binders. KORDEK produces better castings with fewer discards.

CORN PRODUCTS SALES CO.
17 BATTERY PLACE · NEW YORK 4, N. Y.

Some of the more than 300 foundrymen who participated in the annual Christmas party of the Metropolitan chapter, AFA, at the Essex House, Newark, N. J.

(*Continued from page* 174)

of Massachusetts Inc., Everett, Mass.; and Charles A. Reed, Rogers-Brown-Lavino Co., Cambridge, Mass.

At a meeting of the committee for the Sixth New England Regional Conference, Walter M. Saunders was chosen chairman and Merton A. Hosmer, vice chairman. It was voted to hold the conference March 29-30, at Massachusetts Institute of Technology.—*Merton A. Hosmer, retiring president.*

New Jersey

BECAUSE of the rising cost of labor and the actual scarcity of labor itself, foundry managers should direct increasingly serious attention to the mechanizing of their operations, J. B. Lamenzo, Hartford Accident & Indemnity Co., Hartford, Conn., told the more than 100 in attendance at the New Jersey Foundrymen's Association meeting, Newark Athletic Club, Newark, N. J., Jan. 21.

Setting forth what can be accomplished, he presented results of a study of the foundry industry of New England he made while he was an army officer connected with the United States Public Health Service on loan to the state of Connecticut. He emphasized in particular the progress in mechanizing mold and sand handling equipment suitable for jobbing foundries—both iron and brass foundries. Mr. Lamenzo illustrated his remarks with a number of interesting lantern slides.

While admitting that mechanical equipment in general now is difficult to obtain for early installation, the speaker urged prompt and careful study of the problem so as to get improvements which may be deemed desirable under way as soon as possible.

He declared that many foundrymen have misconceptions about mechanization, claiming that their plants are too small to make such procedure economical, or that they do not have the space for mechanical equipment. He thought investigation of the possibilities would change their ideas materially and that it would help some at least if they would think more in terms of semi-automatic procedure in their planning.

Mr. Lamenzo said that it is difficult to estimate accurately the amount of savings that could be accrued by those planning to install labor saving equipment, but emphasized the importance of careful planning and supervision.

He suggested that before doing anything else in a program of procedure, foundrymen set down on paper precisely what they would like to have done and "don't worry too much at first about how it is to be done." There is time then,

(*Continued on page* 178)

Take this kind of look at X-ray... *in terms of your own records*

Foundry job "A" – Order of Steel Castings
1. Took 6 weeks to get into production
2. Our own rejections ran 40%
3. Customer rejected entire $75,000 order when machining revealed internal irregularities
1. Radiographs of pilot castings could have started sound production much sooner
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NOW IS THE TIME to take a fresh look at industrial radiography . . . to evaluate it in terms of your own costs . . . in terms of all of the circumstances peculiar to your business alone. Your local x-ray dealer will be glad to confer with you . . . may be able to make practical, profit-building suggestions. Or write to

EASTMAN KODAK COMPANY, X-RAY DIVISION
ROCHESTER 4, N. Y.

Radiography ... *another important function of photography*

Kodak

(*Continued from page* 176)

he said, to talk to sellers of equipment and to make visits to other foundries where it is known that successful programs of mechanization are in effect. Also, he said, foundrymen should realize there is no particularly standard type of layout; it must be tailor-made to suit the needs of the individual foundries, he asserted.

The speaker, who discussed the study at some length in an article "Foundries of the Future" in the November and December, 1945, issues of THE FOUNDRY, made several observations which he regarded as of special importance in the mechanization of foundry procedure: The molder should be in a position to make molds only; pouring should be centralized; sand should be controlled closely; there should be good supervision; ample sand storage facilities; and provision for good housekeeping in general. —*Ben K. Price.*

Central Indiana

AT the Jan. 7 meeting of the Central Indiana Chapter of the AFA, Ralph L. Lee, employee co-operation staff, General Motors Corp., Detroit, presented an interesting talk on "Leadership and What It Takes." From his wide experience on the subject, Mr. Lee related numerous incidents to describe various types of foremen and bosses, illustrating his examples with histrionic ability. The need for men in positions of leadership to understand their workers, was stressed. The art of humanics, Mr. Lee pointed out, has been sadly neglected in industry, and yet this phase of all operation may be the deciding factor in the over-all economic picture for any organization.

William Ziegelmueller, Electric Steel Castings Co., Indianapolis, served as technical chairman of the meeting.—*B. P. Mulcahy, historian.*

Philadelphia

JAN. 11 meeting of the Philadelphia Chapter of the AFA was attended by 200 members and guests. John Robb, chapter chairman, presided and welcomed 16 new members, the product of activity on the part of the membership committee.

Nathan Janco, president, Centrifugal Casting Machine Co., Tulsa, Okla., was the guest speaker and made clear the terminology regarding centrifugal casting, semicentrifugal casting and centrifuging. He discussed the advantages of centrifugal force as an aid in the manufacture of steel, iron and nonferrous castings. Slides, illustrating the various types of gating and risering which might be used, clarified the discussion.

The speaker stressed the point that a sound casting in steel, whether produced by centrifugal or static method, would have equal properties. He pointed out, however, that some castings were made sound more easily by the centrifugal method because directional control of metal flow aided in establishing desirable temperature gradient from the outer to the inner portion of the casting. A question-and-answer period followed the talk. C. L. Lane, Florence Pipe & Foundry Co., acted as technical chairman of the meeting.—*E. C. Troy, publicity chairman.*

Canton

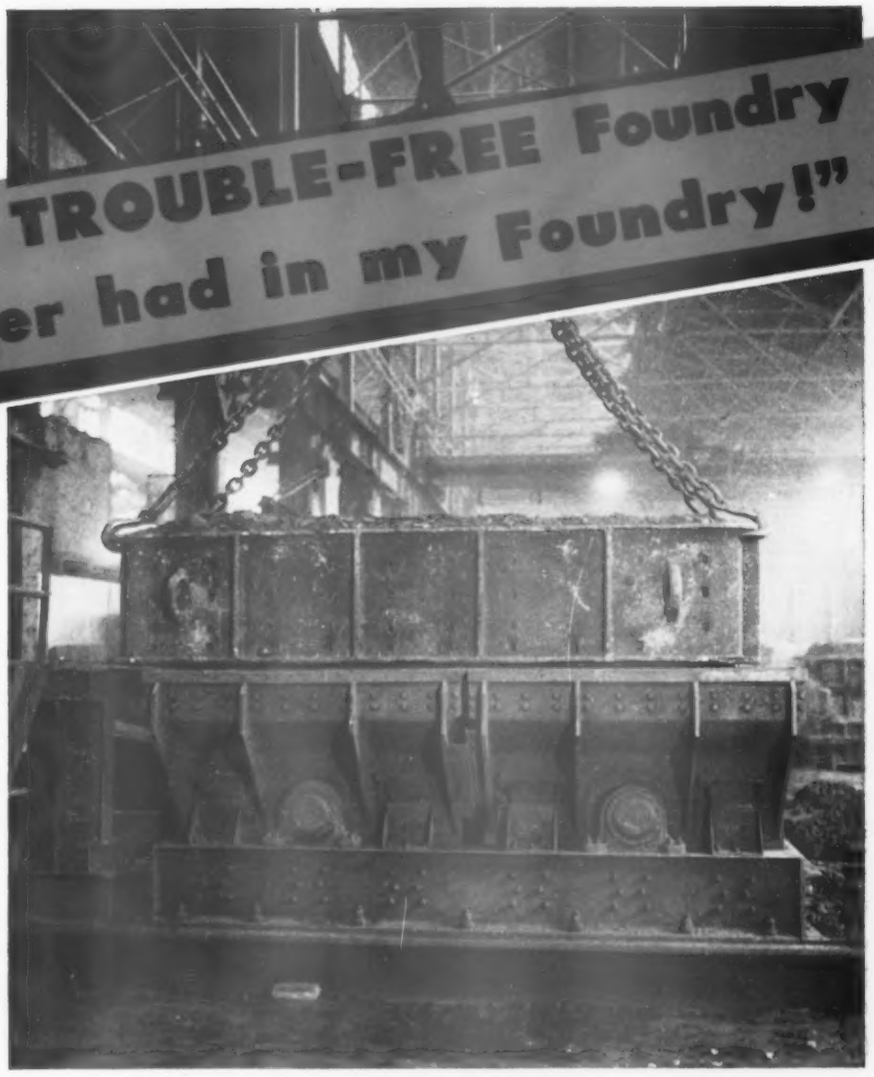
JAN. 10, meeting of the Canton District Chapter of the AFA was held at the Massillon Club, Massillon, O., with 88 members and guests in attendence. Seven new members have been added to the chapter roll.

Conrad Traut, the Hoover Co., presented another in his series of talks on "Job Relations," preceding the main speaker Mr. Traut's subject was "The

(*Continued on page* 182)

WISCONSIN: Annual Christmas party of the Wisconsin Chapter, AFA, at Milwaukee attracted its usual large crowd, as views on this and the succeeding page indicate. (Photos courtesy John Bing, A. P. Green Fire Brick Co., Milwaukee)

"The most TROUBLE-FREE Foundry Unit I ever had in my Foundry!"



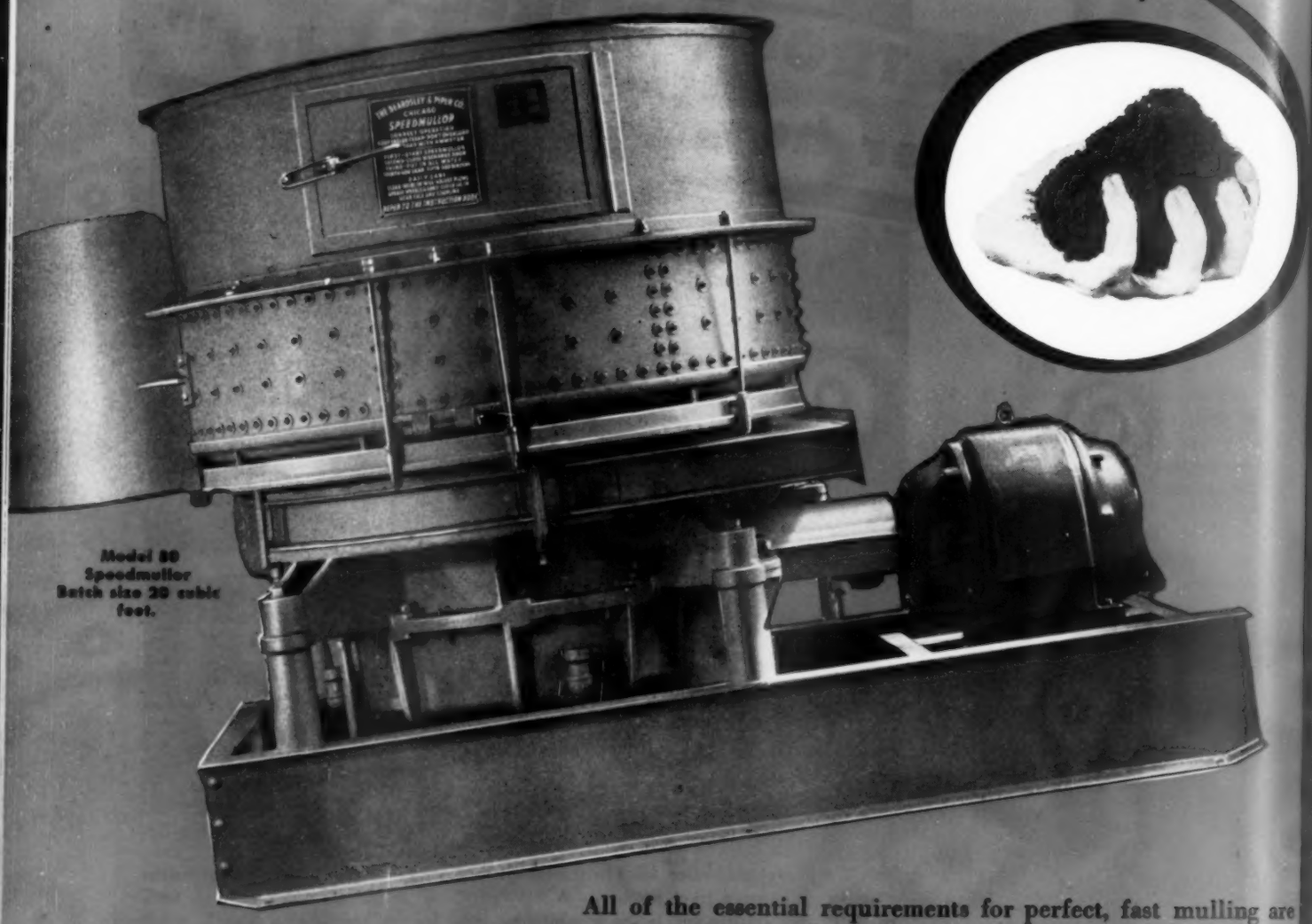
MEMBER
MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

This is a direct quotation from a statement made by the General Superintendent of a large Eastern steel foundry. A SIMPLICITY 8′ x 10′ Dual Shake-Out, such as illustrated by the cut, is the machine covered by the quotation. The 8′ x 10′ Dual Shake-Out was installed in this steel foundry in 1942 and has been in active service since that time. The first SIMPLICITY Gyrating Shake-Out was installed in a malleable iron production foundry in March 1933. Since that time 53 different sizes and models of shake-outs have been built to meet customers' requirements. Today, SIMPLICITY Shake-Outs are operating in 310 gray iron foundries, 188 steel foundries, 130 non-ferrous foundries and 40 malleable iron foundries. The SIMPLICITY Gyrating Shake-Out filled the urgent need for a high speed, efficient flask shake-out and casting knock-out unit. These points were bottlenecks in nearly every operation, before the SIMPLICITY units were installed.

Simplicity
TRADE MARK REGISTERED
ENGINEERING COMPANY
DURAND, MICHIGAN

Speedmullor Sand

MEETS YOUR EXACT REQUIREMENTS!



Model 80
Speedmullor
Batch size 20 cubic feet.

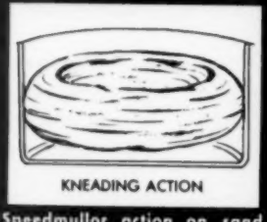
Speedmullor-processed sand assures thorough distribution of all additions, is free from lumps and requires no further aeration. Every time, every batch, the Speedmullor mulls sand that will pass the most exacting tests!

All of the essential requirements for perfect, fast mulling are incorporated in the Speedmullor: (1) Pressure — continuous squeezing without damaging sand structure; (2) Rapid agitation — entire batch receives thorough mulling; (3) Blending — uniform distribution of bonding elements; (4) Thorough aeration and fluffing.

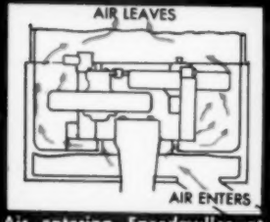
The Speedmullor is the only machine that mulls the sand between a rubber-lined wall and rubber-tired wheels. These surfaces do not crush or grind and will outlast steel many times.

HERE'S HOW THE SPEEDMULLOR OPERATES

Speedmullor squeezes and kneads sand between resilient rubber surfaces which last indefinitely because of resistance to abrasive action.



Speedmullor action on sand holds it in suspension as it kneads and mulls . . . evenly coating each grain of sand with binding material.

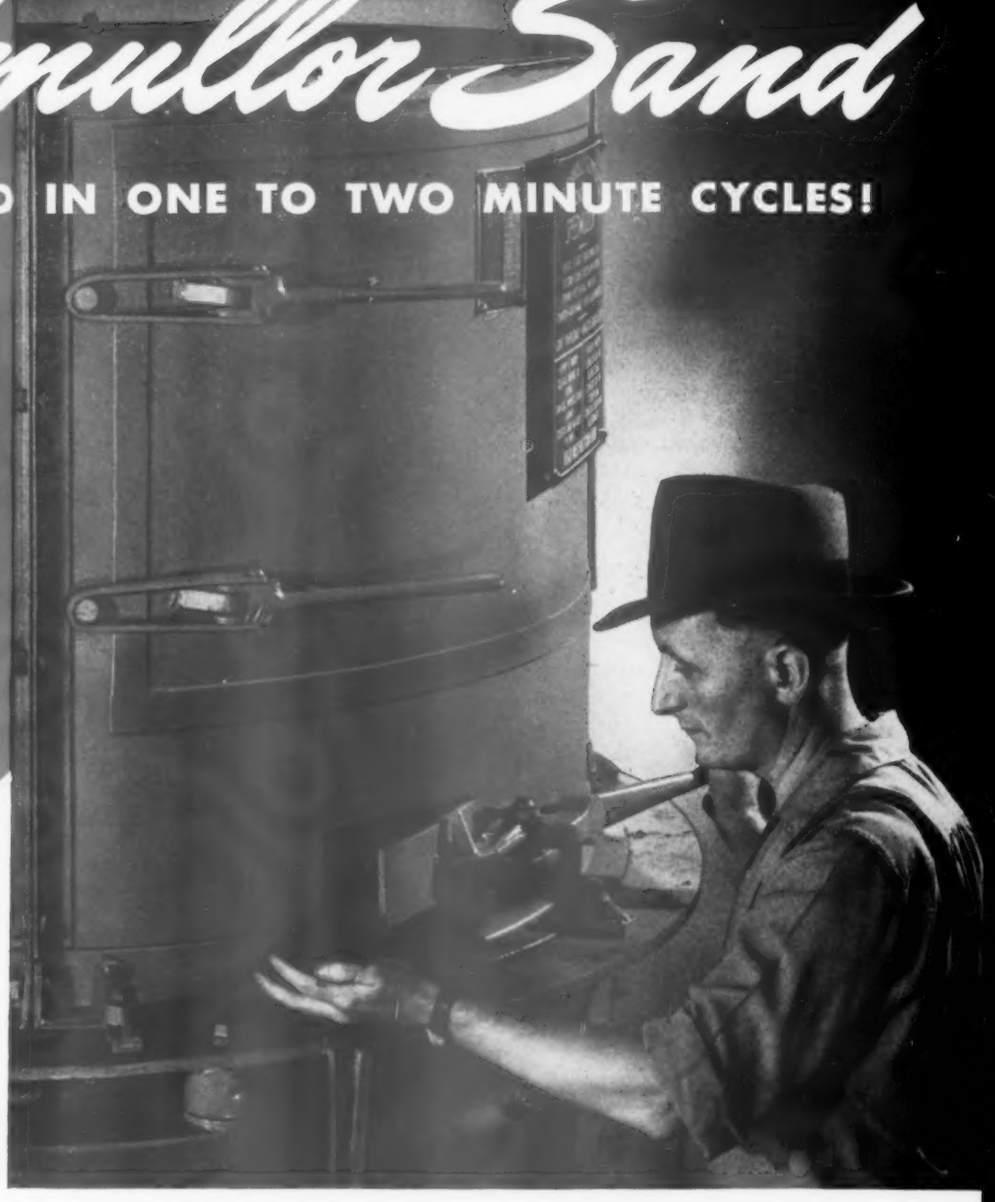


Air entering Speedmullor at bottom is forced through suspended sand, quickly cooling it to within a few degrees of room temperature.

Speedmullor causes rapid, continuous agitation of sand, binders and moisture. Constantly in motion, each sand grain becomes uniformly coated.

Speedmullor Sand

MULLED IN ONE TO TWO MINUTE CYCLES!



4½ TIMES FASTER!

The Speedmullor is *at least* 4½ times faster than any other mulling method! Time it yourself as the rubber-tired wheels squeeze the sand against rubber-lined walls. This action plows, tosses, tumbles and agitates the sand... providing the fastest, most thorough mulling possible.

Where desired the Speedmullor may be had with air cooling to bring hot sand down to room temperature *while it mulls.* In some instances a batch of sand is thoroughly mulled in only 30 seconds. Speedmullors assure large savings in core oils and binders . . . producing a mix which provides cleaner, smoother castings.

Speedmullors are offered in a variety of sizes, with or without skiphoist; air cooling; fines removal. Also available for completely automatic operation; batch weighing, loading, mulling, cooling, and discharging.

SEE THE SPEEDMULLOR OPERATE!

See the Speedmullor operate! We will make complete arrangements to have you see a Speedmullor in action in a foundry near to you. Write today!

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THE BEARDSLEY & PIPER COMPANY ARE MANUFACTURERS OF SANDSLINGERS
SPEEDSLINGERS • SPEEDMULLORS • SCREENARATORS • MULBAROS
SHAKE-OUTS • SAND CONITIONING MACHINES • GYRATORY SCREENS

(*Continued from page* 178)
Job Relations School."

Adrian C. Den Breejen, Hydro-Blast Corp., Chicago, gave an illustrated talk on "Practical Foundry Sand Problems." Comments on the chemical and physical aspects of sand were made clear by the use of slides. The speaker's remarks on particle size and its relation to permeability and tensile strength were instructive and should help to make members more sand-conscious. During the question period which followed the talk, the audience took advantage of Mr. Den Breejen's wide experience with sand problems.—*Nils E. Moore, reporter.*

Cincinnati

APPROXIMATELY 80 members and guests attended the Jan. 14 meeting of the Cincinnati District Chapter of the AFA, which was held at the headquarters of the Engineering Society. The meeting was dedicated to the future foundrymen of America and to the attention of students and education counselors of high schools and colleges of the Cincinnati area. Fourteen of the latter were present as guests of the chapter. The guests were welcomed by Chairman A. W. Schneble and by a former chairman, Edward King of the Hill & Griffith Co., who pointed out the need for high caliber recruits in the foundry industry.

Speaker of the evening, Tom Barlow, Battelle Memorial Institute, Columbus, O., presented his subject, "Cupola Practice," in an entertaining manner. An appeal was made for close supervision to obtain reproducible results from the cupola, rather than to blame unpredictable factors for its vagaries. Considerable interest was evidenced by the students and educators present. The chapter plans to make their presence a regualr feature of future meetings.—*William H. Hoppenjans Jr., secretary.*

Texas

TEXAS Chapter of the AFA held its Jan. 24 meeting at the Plaza Hotel San Antonio, with 48 in attendance. After the dinner, Chairman E. P. Trout opened the meeting with the announcement that about two-thirds of those present were guests. He introduced Ben Newman of Temple Iron Works, Thomas J. Crow of Sheffield Steel Corp., and Jack Barker of Acme Brick Co., and expressed the desire of having another meeting of the chapter in San Antonio next year.

F. M. Whittlinger, a director of the national association, was introduced and called upon to discuss the coming Foundry Congress which will be held in Cleveland, May 6-10. Mr. Whittlinger stated that he had recently attended a director's meeting of the national association, held in Chicago, and learned that this congress would undoubtedly surpass in interest and size any previous one held. He requested members to write to the chairman or secretary and offer suggestions as to the type of program desired or subjects of special interest.

After a brief introduction Chairman Trout presented Harry Linderman of the Dallas office of Laclede-Christy Clay Products Co., whose technical paper, entitled "Properties of Refractories," gave a concise and informative review of the four classes of refractories, namely, silica, acid, basic and neutral. These were charted to show comparative physical properties, costs and specifications. Another chart outlined the utility of these products. The speaker brought out the interesting fact that simply by changing the degree of the several processing operations of the raw material, bricks of entirely different quality may be obtained, yet have the same chemical analysis. Mr. Linderman explained that the mortar used should be equally as good as the brick used in lining, to secure the maximum life of the brick. He responded to several questions of interest from the floor, particularly in connection with cupola linings, pointing out that it is generally conceded to be economical to use fire clay patching in the melting zone until the lining farther up needs replacing.

Chairman Trout expressed appreciation

Responsible in large part for success of the Wisconsin Chapter Christmas party were (top right corner) Everett Carpenter, Carpenter Bros. Inc., chairman, and Joe Risney, International Molding Machine Co., co-chairman of the committee in charge

to Mr. Linderman for presenting the paper, and to William Ferguson, chairman of the program committee, as well as Walter Temple, for their work in making the San Antonio meeting successful.—*R. H. Glenney.*

Chicago

FOR the Chicago Chapter of AFA, the round-table type meeting continues to hold the special appeal demonstrated over the past three years. Thus it becomes clearly evident that the popularity of these meetings is of fundamental character and has not been inspired by a temporary necessity to seek information and exchange experiences in connection with unusual and pressing problems in production of castings for war.

Almost 200 members of the Chicago Chapter convened at the Chicago Bar Association, Feb. 4, and participated in the four simultaneous sessions sponsored by the gray iron, malleable, nonferrous and steel divisions. This was the second in the series of three group meetings scheduled by the chapter for the 1945-46 season. Chapter President J. C. Gore presided at the dinner preceding the group meetings.

"Make-up of Gray Iron" was the discussion topic of the gray iron division, with H. Kenneth Briggs, metallurgist, Miller & Co., Chicago, as the speaker. Mr. Briggs centered his remarks on the fundamentals of gray iron mixing. G. W. Anselman, service engineer, Geobig Mineral Supply Co., Chicago, presided.

Robert P. Schauss, superintendent, Chicago Works, National Malleable & Steel Castings Co., addressed the malleable division on "Modern Annealing Practice." W. D. McMillan, works metallurgist, McCormick Works, International Harvester Co., Chicago, served as chairman.

Topic for the nonferrous division was "Some Casting Reactions and Properties of Brass and Bronze Castings," with Herman L. Smith, metallurgist engineer, American Smelting & Refining Co., Pittsburgh, as the speaker. Chairman was L. G. Jessup, foundry technician, Federated Metals Division, of the same company, Whiting, Ind.

"Refractories" constituted the subject matter for the steel division, and covered brick and monolithic linings of acid, basic and neutral materials for longer life and lower costs of furnace and ladle lining. Because of scope embraced, formal discussion was contributed by a panel consisting of John H. Owen, sales engineer, Harbison-Walker Refractories Co., G. S. Kennelley, salesman, General Refractories Co., Ray A. Witschey, ceramic engineer, A. P. Green Fire Brick Co., and S. E. McGinty, sales manager,

MULBARO Cuts

SAND PREPARATION TIME 50%

"A 50% cut in our core sand preparation time with the Mulbaro! That's a real saving!" say officials of the Milwaukee Flush Valve Company, Milwaukee, Wisc. "What's more, the Mulbaro has paid for itself in oil savings alone in less than a year, due to more thorough, more uniform sand mulling which meets our exact molding requirements." Foundries, large and small, use the Mulbaro for facing and backing as well as core sand.

How the Mulbaro works: Sand is shoveled into barrow. Filled barrow is then wheeled into position under the mulling unit.

Mulling unit is lowered onto barrow with a hoist. Required amount of oil is added and within a few minutes, sand is completely mulled.

Mulled sand is now moved away to molding machines; another barrow of sand is placed under mulling unit.

ONLY $895*

*Entire Mulbaro unit costs only $895.00 F.O.B. Chicago . . . additional barrows are $95.00 each.

Get complete engineering data and specifications on this amazing mullor . . . write today!

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Manufacturers of Speedslingers, Speedmullors, Sandslingers, Screenarators, Mulbaros, Shake-Outs, Sand Conditioning Machines

Firegan Sales Co., all of Chicago. A. W. Gregg, executive engineer, equipment division, Whiting Corp., Harvey, Ill., acted as chairman.

Next regular meeting of the chapter, on March 4 at the Chicago Bar Association, will be under sponsorship of the pattern division. Speaker will be A. F. Pfeiffer, assistant general superintendent, Allis-Chalmers Mfg. Co., Milwaukee, and his subject "Dimensional Control in Foundry Practice."—*Erle F. Ross.*

Central Ohio

APPROXIMATELY 125 members of the Central Ohio Chapter of the AFA attended the Jan. 28 meeting, held at the Fort Hayes Hotel, Columbus, O. Under the able leadership of Ray Frank, Bonney-Floyd Co., Columbus, on steel, David Whyte, Cooper-Bessemer Corp., Mount Vernon, O., and Grove City, Pa., on gray iron, and Dr. L. W. Eastwood of Battelle Memorial Institute, Columbus, on nonferrous metals, a roundtable discussion on casting defects was conducted.

This type of meeting, which has proved so popular with the chapter, is always based on some particular subject of common interest, utilizing local men for discussion leaders. As a result, discussion is unusually brisk, and many practical problems are brought up for solution.

The technical session was preceded by a dinner featuring Maj. Norman Imrie, formerly of the *Columbus Dispatch*, who enlarged in a most interesting manner on the theme, "Do the Best That You Can, With What You Have, Where You Are."—*Tom Barlow.*

Central New York

REGULAR monthly dinner meeting of the Central New York Chapter of the AFA was held Jan. 11 at the Onondaga Hotel, Syracuse, N. Y. Chairman E. G. White presided and introduced the speaker, M. T. Ganzauge, General Railway Signal Co., Rochester, N. Y.

Mr. Ganzauge, one of the original members of Central New York Chapter, was instrumental in establishing the Rochester Chapter of the AFA, in May, 1945. He was selected by the government as a member of a board to investigate German industrial capacity, particularly in the foundry industry, shortly after VE-Day, and using slides made from photographs he had personally taken, gave a splendid description of his trip which included foundries and steel mills in several industrial districts of Germany, Austria and Czechoslovakia.

The speaker reported that Germany had done considerable work with centrifugal castings. This was necessary because of the substitution of chrome alloy steel for bronze which was very scarce. Castings of 1/32-in. sections were successfully cast centrifugally of this steel. Gun barrel castings that ran into tons were also manufactured in this way.

Various types of molding and core sands used in these foreign foundries were also described by Mr. Ganzauge, as well as methods of gating, sand conditioning, mold handling, etc. Blowing of cores was used more extensively in German coremaking than in this country. Even small foundries had coreblowing equipment. Foundry workers consisted primarily of girls, women and prisoners. Mechanized equipment was widely used and production schedules were surprisingly high for the type of help available.

Some of the speaker's slides were of bombed-out foundries and steel mills, and showed the terrific destruction wrought by our aerial attacks. However, according to records, German casting production reached its peak in the fall of 1944. By interspersing his technical descriptions with various nontech-

GOLDEN ANNIVERSARY: Scenes on the occasion of the 50th anniversary celebration of the New England Foundrymen's Association, held at Boston Jan 9. (Photos courtesy C. A. Wyatt, Debevoise-Andreson Co. Inc., Boston)

nical side lights, Mr. Ganzauge held the attention of all present, throughout his talk. Interest in his subject was evidenced by the numerous questions at the conclusion of the lecture.

Serving of refreshments brought to a close one of the most interesting meetings the chapter has ever held. — *John A. Feola, reporter.*

Pittsburgh

PITTSBURGH foundrymen heard E. C. Zirzow, National Malleable & Steel Castings Co., Cleveland, discuss fundamentals of sand control at the Jan. 21 meeting held at the Fort Pitt Hotel. His talk dealt primarily with proper procedures in selecting sands and binders for molds and cores; the relationship of various sand properties to casting defects; and the determination of limitations for strength, permeability and moisture.

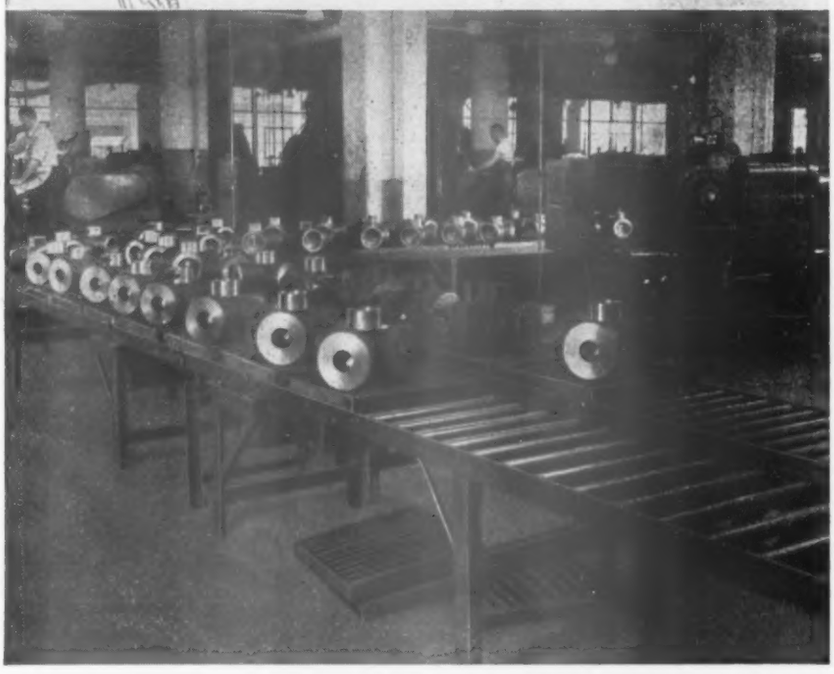
Close moisture control is absolutely essential for good sand practice, Mr. Zirzow said. In all cases moisture should be held at lowest limits possible for good moldability. These limits will run from 2 per cent in some steel shops to as high as 9 per cent in nonferrous foundries. Safe control tolerances are 0.4 per cent in the lower ranges and 1.0 per cent in the higher ranges. Care should be taken in the selection of the man for tempering the sands.

Special tests, such as green deformation, hot deformation, flowability, expansion and contraction, and sintering, are all related to a large extent to a close control of the raw materials and proper control of strength, permeability and moisture.

Cuts or washes give the foundryman plenty of grief and cost the average foundry thousands of dollars annually, Mr. Zirzow stated. This defect is usually caused by a weak sand but may be due to lack of strength at elevated temperature. Before the introduction of hot strength testing the sand technician was at a loss to explain this defect when his green and dry strength were within the proper limits. By this fact he found that some clays and natural bonded sands, even though they produced good green and dry strengths, did not have strength at the temperature the sand reached during the pouring operation. There are times when gating or poor control of the flow of the metal is responsible for this defect.

Scabs are caused by excessive amount of clay in the sand which produces high contraction, high green strength, high deformation, and low sintering. Scabs also are caused by low permeability which may result from an excessive amount of fines or clay or a high moisture

INDUSTRIAL "GOOD HOUSEKEEPING" *Pays Dividends!*



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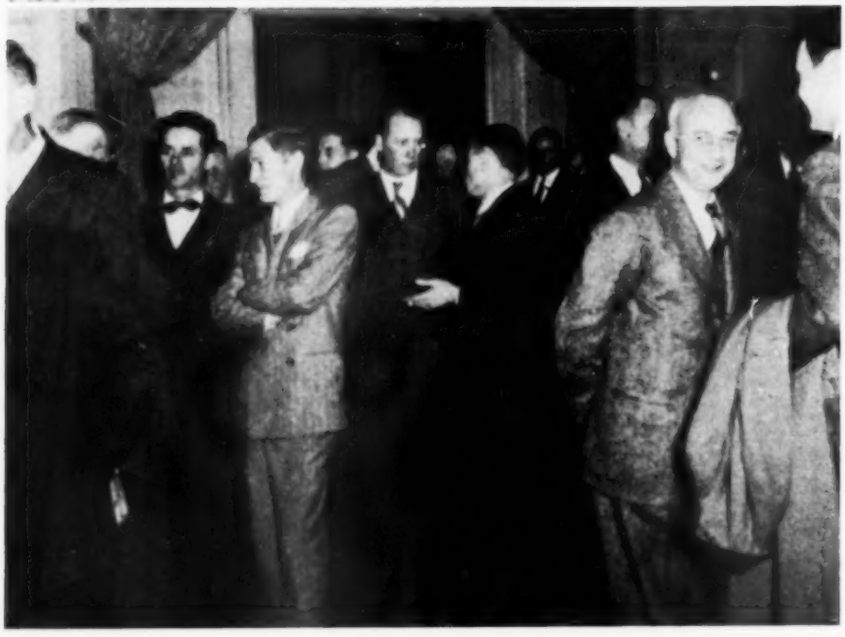

BIRMINGHAM: January meeting of Birmingham District Chapter, AFA, featured a Quiz program with specialists present to answer any and all questions pertaining to foundry subjects. Accompanying views show: (Top, left to right)—J. Arthur Woody, chapter chairman; Fred K. Brown, secretary-treasurer; Jim A. Bowers, program chairman; J. P. McClendon, publicity chairman; Abe Holberg, membership chairman; John Wakeland, director. (Center, left to right)—Dr. James T. MacKenzie, Joe T. Gilbert, W. O. McMahon, J. Arthur Woody, Fred K. Brown, W. M. Mobley, John Wakeland. (Bottom)—Birmingham chapter members talk shop before the Quiz program. (Photos courtesy J. P. McClendon, Stockham Pipe Fittings Co.)

content. Hard ramming and improper gating in cany cases also are the direct cause of a scab. Drops are usually caused by low green strength or insufficient ramming. A machine that does not draw true, a warped flask, or rough handling many times cause this defect. Swells or strains are caused by either low mold hardness or low green strength. This defect is also caused by improper clamping, by using too light a mold weight, or by pouring too fast. Dirt or sand holes are caused by slipshod molding practices or by scabs or cuts which loosen the sand particles.

Fundamentally to produce sound castings a foundry must have the proper metal and the metal must be poured into a medium that will give a sound casting, Mr. Zirzow concluded.—*J. C. Sullivan.*

Cleveland

A DISCUSSION of "Different Ways of Molding a Pattern" featured the technical part of the program at the Jan. 31 meeting of the Patternmakers Group of Associated Industries of Cleveland in Hotel Cleveland. At the opening of the meeting President Vince Sedlon reviewed the history and activities of the patternmakers group from its organization in 1915 to the present. Interest in the subject of apprentices induced the group in 1930 to set up a training program with Frank Cech as instructor. Here the speaker introduced a complimentary reference to the work of Mr. Cech and to the manner in which he had developed and has since maintained the pattern shop department in the Cleveland Trade school sponsored by the Cleveland Board of Education.

In the early days of the recent war years the group was forced to protest several actions of the draft boards. A great deal of credit was due M. Kohler for persuading a government organization to rescind one of its rulings and permit the use of secondary aluminum in pattern construction. Largely through the efforts of E. C. Kindt, the practice of holding technical meetings was started in 1943. As a final item the speaker, who has been president of the group for the past five years, announced that Peter Rettig had been elected president for the coming year. Following a brief salutatory address by the incoming president, the meeting was turned over to George Gedeon who introduced the speaker of the evening, Ed, Pierie, wood shop foreman of Motor Pattern works, Cleveland.

Selecting two patterns, a piston for an internal combustion engine and a gate valve, the speaker with the aid of many large scale drawings, discussed the various methods by which the casting could be made, with comment on the

advantages and disadvantages of each method. In the question period which followed the presentation discussion was not confined to the items shown, but included references to many other phases of patternmaking and molding.—*Pat Dwyer.*

Wisconsin

REGULAR monthly meeting of the Wisconsin Chapter of the AFA, held Jan. 11 at the Schroeder Hotel, Milwaukee, was devoted to sectional meetings of the malleable and gray iron, steel, pattern, technical and nonferrous groups.

Joseph Kropka, superintendent of the malleable plant, Chain Belt Co., Milwaukee, was chairman of the malleable and gray iron groups, which held a joint session, and was assisted by Charles Zahn, Vilter Mfg. Co., Milwaukee. L. P. Robinson, director of core oil sales, Werner G. Smith Co. whose subject was, "Grain Distribution and Control of Core Sands," pointed out that the type of sand used has an important bearing on the final cores. Sand and oil ratio should be closely watched, and will vary considerably due to variations in the type of castings being made. Sand and oil ratio varies from 30 to 1, to 80 to 1, the variation depending upon type of mixer used as well as types of ovens and binders.

In using binders one should know their physical as well as chemical characteristics, in order to obtain best results. Practically any binder may be used if the knowledge of its mixing and baking is known. A coreroom foreman should take into consideration time and temperatures, in reference to baking cores. The rule of one hour of baking for every inch of sand, still applies, although faster baking is advocated in continuous ovens at expense of foundry scrap. Venting of cores is important and should be followed discreetly. Many types of vents are used but if vents are placed in cores, the vent should be opened. If the core is well vented and the mold is not, the result usually is a blow.

Harold Ziebell, Crucible Steel Casting Co., was chairman of the steel group. Leroy E. Everett, L. B. Knight & Associates, Chicago, presented a discussion on "Mechanical Improvements for the Steel Foundry." Mr. Everett stressed the importance of a good organization within the steel plant, with clear-cut lines as to authority and responsibility whereby morale is kept at a high level and production and quality maintained. He also discussed equipment and its application, as well as correct utilization of floor space, pointing out that many plants have modern equipment but fail to get the most out of it because of obsolete assisting procedure. An example of this was a

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Provide the
Utmost in Speed
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FURNACES FOR
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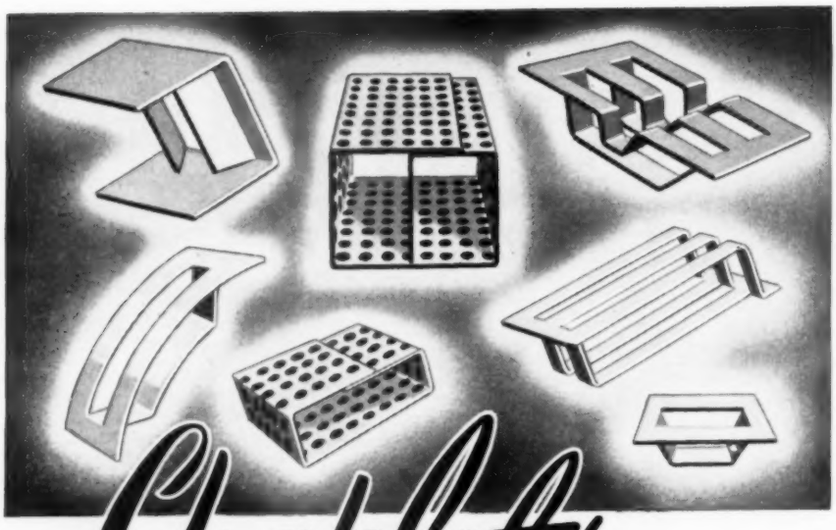

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— are recognized throughout the foundry industry as dependable aids to higher and better production. Trifles in themselves, they have been constantly improved through the years . . . in both design and quality . . . to help the foundryman toward the production of castings which reach the highest possible degree of perfection.

Write for samples and prices of Milwaukee Thread Stem Chaplets . . . Standard Radius Chills . . . Schmitz Chaplets . . . Angle Chaplets . . . Patented Adjustable Radius Chills . . . Shells, Tubes . . . other types of Chaplets and Supplies.

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modern shakeout with a wheelbarrow used for removal of castings. Mr. Everett showed slides of various foundries, illustrating good and bad operations, and showed, by re-arrangement, how improved operations could be obtained.

A. F. Pfeiffer, Allis Chalmers Mfg. Co., was chairman of the pattern group and opened the meeting by stressing the need of training more patternmaker apprentices. He stated that at present there are jobs for more than 5000 additional patternmakers throughout the country. Apprentices are required to serve a five-year apprenticeship instead of the customary four, in many areas.

Harry A. Nelson, chief of training and education, Veterans Administration in Wisconsin, addressed the group, and gave an outline of the GI Bill of Rights, and the aims of the administration. Wisconsin has an outstanding record in getting the returned veterans back to work, both able and disabled. He advised that the men coming back are older and more mature; about 63 per cent have had some technical experience, either at school or in actual service. They are given aptitude tests so that they can be placed to the best advantage to both employee and employer. Mr. Nelson stated he would like to have the veterans know more about the foundry industry, through pamphlets and pictures, so that more men could be placed there. Announcement was made, at this time, that a book is being prepared by the Wisconsin Chapter which will give a favorable picture of the foundry industry.

Small Number in Foundry

The speaker said that to date about 103,000 veterans are participating under the G I bill. about 5 per cent of this number are employed in foundry trades. In Wisconsin, approximately 5000 are employed at different occupations, of which 40 per cent are receiving training on the job. Besides compensation from the employer, the veteran, if single receives $65 a month, and if married, $90 a month, from the government.

Harry F. Stoddard, veteran counselor, Allis-Chalmers Mfg. Co., Milwaukee, then described the procedure in handling veterans at that plant. He explained that all of them are not suited for the pattern trade, because of the high skill required. He also stated that veterans present no problems to his company and they have had no justifiable complaints against any foreman or supervisor in the entire plant. A discussion period followed the meeting which was attended by 38 participants.

H. C. Stone, Belle City Malleable Iron Co., Racine, Wis., was chairman of the technical and nonferrous groups,

(*Continued on page* 190)

RANSOHOFF

Automatic star-return Cleaning Mills

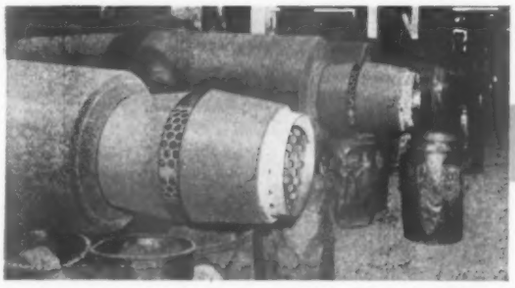
Quicker and Better Cleaning—the Ransohoff Way

SAVE 30% to 70% ON YOUR CLEANING COSTS

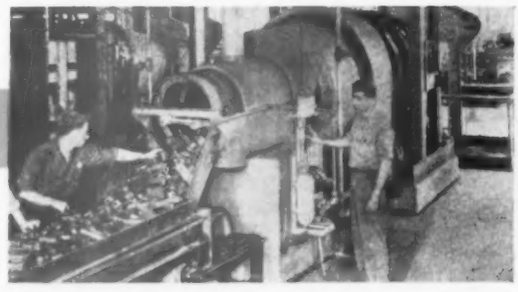
SPEEDY — gentle — automatic handling of stars — not self-destructive.

Send us a sample batch. We will make tests as to the best cleaning methods and render you a complete report without cost or obligation.

Two Side-loading, side-unloading mills for cleaning miscellaneous malleable castings such as differential housings. Installation cleaning time reduced 73%. Sand conveyor is in operation at back of mills.

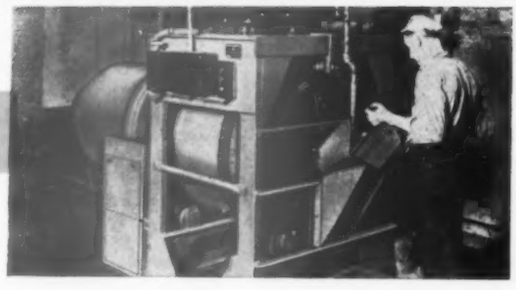


Tumbling piston rings castings after molding and before machining, about 20 minutes per batch. Additional screen for separating pollywags or risers. Same mill used also in production and job foundries.



End-loading, and end-unloading mill. Castings cleaned twice; before sorting and grinding; after sorting and grinding, ready for plating. Discharges onto inspection conveyor table. Power loader in pit.

End-loading, end-unloading wet mill cleaning grey iron pipe fittings. Discharges directly onto sorting table. Power loaders below floor level for loading.



End-loading—end-unloading mill. 36" x 36" tumbling compartment. The low charging height of 37" eliminates need of power loader. For foundries making small castings in small batches or for job brass foundries.

N. Ransohoff, Inc.

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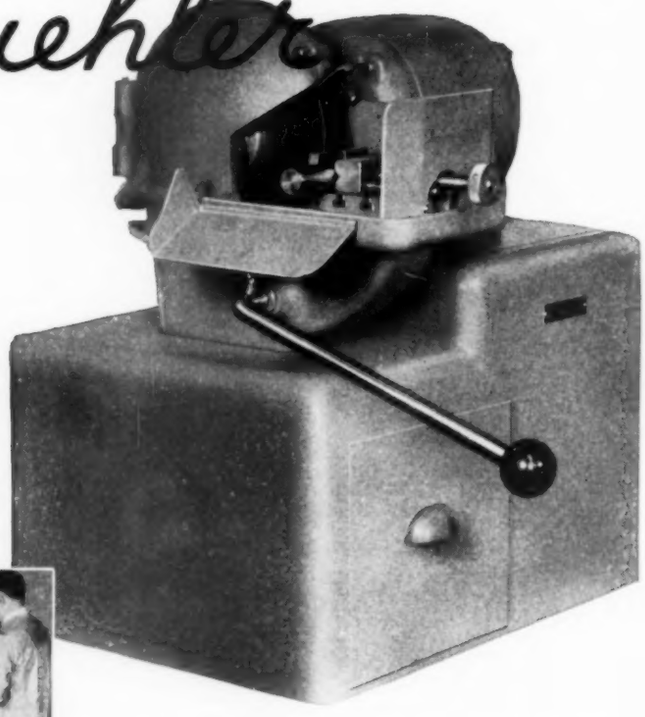
Buehler



TOP: Operates with maximum ease and convenience.

BOTTOM: No. 1016 AB recirculating cooling system.

ABRASIVE CUT-OFF MACHINE No. 1015

This new 1 h.p. cut-off machine is constructed with the usual Buehler emphasis on precision and ease of operation. It is a table mounted model, similar in design and performance to the larger cabinet model No. 1010. Coolant is supplied by a recirculating system comprising No. 1016 tank and hose connections.

This efficient cut-off machine occupies a minimum of space, is economical in cost, and has a capacity for cutting 1" stock. The No. 1015 cutter promises to be one of the most popular cut-off machines in the metallurgical field.

Specifications

1015 AB Cut-Off Machine, complete with wheel assembly and six 9" x 1/16" x 1¼" assorted cutting wheels, specimen table and vise. Motor 1 h.p. 220/440 volt, 60 cycles, AC, 3 phase, 3450 RPM, with electrical control. Complete with sludge trap of heavy pressed steel, with drawer and drain connections for cooling device. Directions included.....$275.00
Dimension 32" x 32" x 27". Shipping wt., 260 lbs.

1016 AB Recirculating Cooling System with heavy tank 19½" long x 12⅝" wide x 9¾" high divided into compartments with handles and cover with 1/30 h.p. 110 volts, 60 cycles, 1 phase motor directly connected to pump including intake and outlet hoses with control valve for 1015 Cutter.....$60.00
Dimensions 21" x 14" x 19". Shipping wt., 40 lbs.

The BUEHLER line of specimen preparation equipment includes

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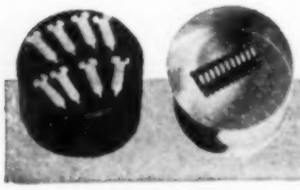

Buehler Ltd.
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METALLURGICAL APPARATUS
165 West Wacker Drive, Chicago 1, Illinois

(*Continued from page* 188)

assisted by Marvin Nevins, Ampco Metal Inc., Milwaukee. Wilbur C. Blott, Allis Chalmers Mfg. Co., addressed the combined session, discussing "Proper Methods of Physical Testing."

Detroit

PAYING formal tribute to their associate member, Fred J. Walls, in recognition of his many years of contributions to the foundry industry and also of his elevation to the national presidency of the AFA, Detroit Chapter members jammed the dining room of the Rackham Memorial Jan. 17 in a meeting that

Fred J. Walls

will long be remembered both by the honored guest and those in attendance.

An honorary scroll was presented to Mr. Walls by Frank G. Steinebach, editor of THE FOUNDRY, while many distinguished visitors, including A. F. Hageboeck, D. J. Reese, E. J. Hergenroether, Vaughan Reid and others, rose with the audience and applauded. Mr. Walls made a brief reply and urged older foundrymen to lend every effort to encouraging younger men toward careers in the foundry industry.

Following the formal presentation, three production problem roundtables were held, each of them featuring nationally known discussion leaders. Consideration of the use of chills in production of aluminum sand castings was directed by L. W. Kempf, director of the research division, Aluminum Co. of America, with A. W. Stolzerburg of the same company as group chairman. Approximately 50 participated in the discussion.

Carbon control in acid electric furnaces was the subject introduced by Charles Locke, chief metallurgist of the West Michigan Steel Foundry Co., Muskegon, Mich., with Ernest Lancashire, Detroit Steel Casting Co., serving as group chairman. There were about 40 on hand

(*Continued on page* 192)

MASTER no man can become, in any pursuit, without full apprenticeship. The competence of the MCA organization has been acquired through long and varied experience.

CRAFT—the developed skill and "know how" of the craftsman—leaves trial and error behind and, following precise formulas and exact procedures, leads to definite results. MCA products and recommendations carry that assurance.

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Acme Foundry
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Celebrating 25th Anniversary

BRADLEY *washfountains*

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(*Continued from page* 190)

for this meeting.

The third roundtable dealt with an overall consideration of pattern problems, and there were some 50 "wood and metal butchers" present to exchange views. Vaughan Reid, president, City Pattern Foundry & Machine Co., acted as chairman and referred specific questions to members of his company's technical staff who were present.

The Detroit Chapter's lecture course, comprising four series of two lectures on succeeding Friday nights, was launched Jan. 18, with over 125 present. Norman F. Hindle of the AFA, addressed one group on the effect of design upon quality of castings, while Victor Zang, Unitcast Corp., Toledo, O., lectured to the second group on troubles encountered in steel molding and coremaking. Succeeding lectures in the course included three on various aspects of gray iron casting, one more on steel casting, one on brass and bronze, and one on aluminum and magnesium.—*Arthur H. Allen.*

Western New York

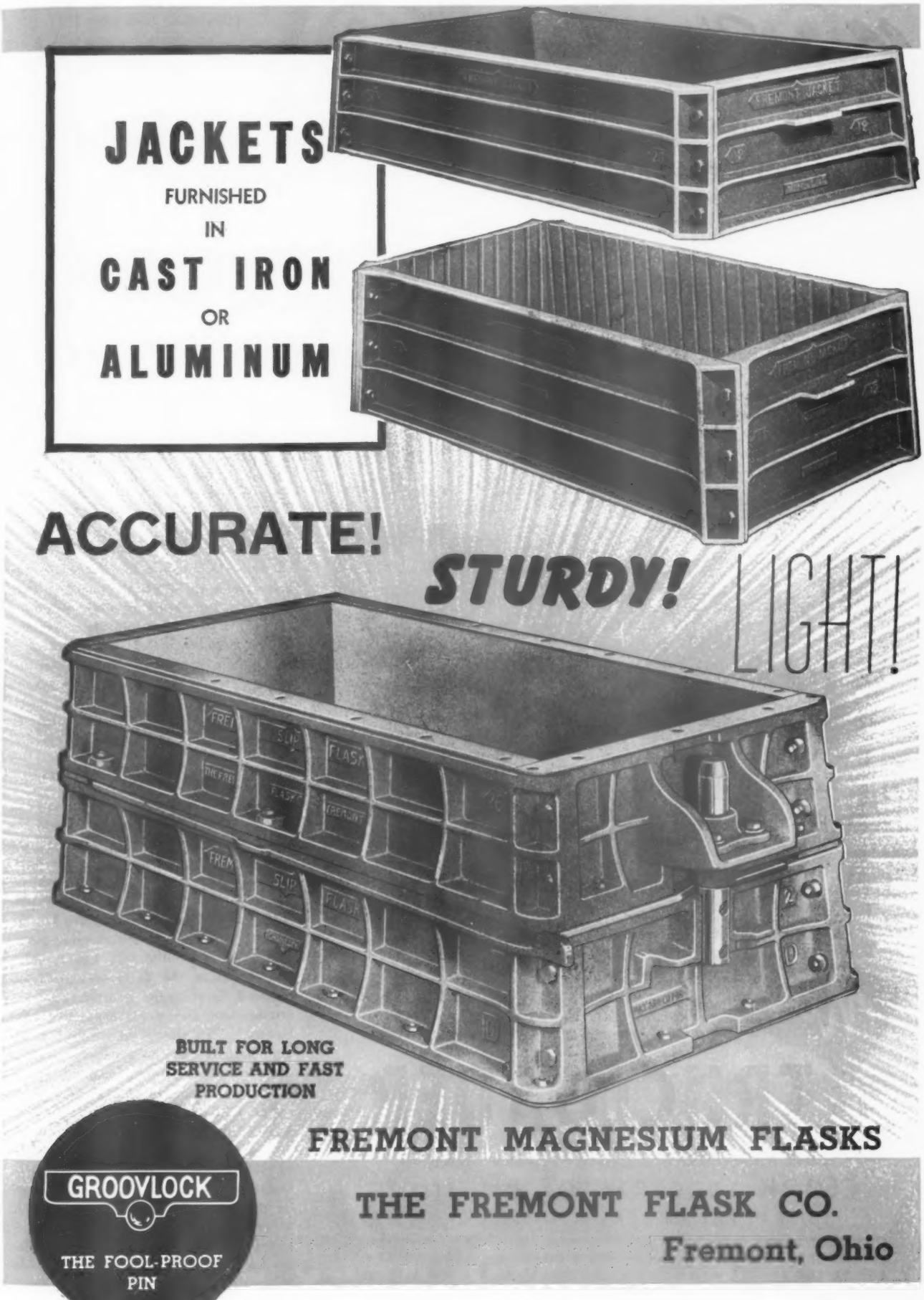
MORE than 300 members and guests attended the annual stag party given by the Western New York Chapter, Jan. 19, at the Elks' Club, Buffalo. A buffet supper followed by an excellent floor show provided by Erwin Deutschlander and his entertainment committee, combined to make the party a grand success.

Regular monthly meeting of the chapter was held Feb. 1, at the Hotel Touraine, Buffalo, with 55 members and guests in attendance. Chairman Arthur H. Suckow presided and introduced Thomas E. Barlow, foundry engineer, Battelle Memorial Institute, Columbus, O., who was the guest speaker. His subject was "Gray Iron Specifications."

Mr. Barlow reviewed the numerous specifications in existence today for the production of gray iron castings. Some of these specifications are confined to chemical analyses, some to physical properties, while others cover a combination of both. Many are so complex that the average foundryman finds it impracticable, if not impossible, to meet them.

The speaker stated that most specifications are written by designing engineers, not foundrymen, and it is felt that the best way to bring about a simplification of them is for foundrymen to work more closely with the engineers who prepare them. First of all, the foundryman must know the properties of the iron he can produce so that he can specify to the engineer why specifications should be written in a certain way. For example, if the engineer wants heat, shock or wear

(*Continued on page* 194)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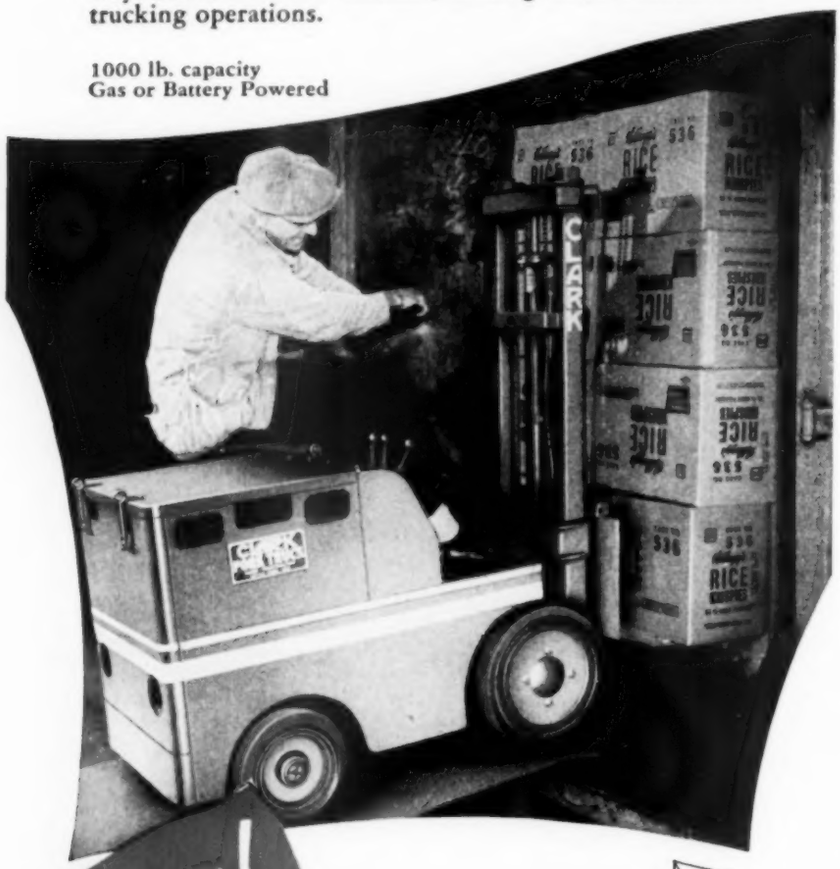

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(*Continued from page* 192)

resistance, he must know how high it will be possible to run the total carbon in the casting and still get the tensile strength required. In some cases, carbon and silicon in the right proportions may give the desired results, but if not, then consideration must be given to the use of alloys to make the casting suitable for the purpose attended.

Discussing at considerable length the importance of "section sensitivity," as related to specifications and the effects of carbon, silicon, phosphorus and manganese, as well as allowing inocculants, in producing gray iron castings to meet various needs, Mr. Barlow gave an interesting talk. A lively discussion followed.—*Leo A. Merryman, secretary.*

Connecticut

MONTHLY meeting of the Connecticut Nonferrous Foundrymen's Association was held Jan. 16 at the Hotel Taft, New Haven, with a large attendance.

A. B. Oatman and J. F. Uhl, National Carbon Co. Inc., New York, displayed their industrial film, in color, which showed the manufacture of electrodes and anodes for electrothermal and electrochemical applications, and covered the processing of carbon into electrodes and anodes from selection of raw materials to end production use in electric furnace and electrolytic cells. A discussion period, following the showing of the film, developed general participation.—*Louis G. Tarantino, secretary.*

Southern California

ONE of the finest nonferrous talks of the current season was heard by over 100 members and guests of the Southern California Chapter of the AFA, when George K. Dreher, vice president, Ampco Metals Inc., discussed "A Practical Approach to Bronze," at the Jan. 11 meeting, held at the new meeting place, Roger Young Auditorium, Los Angeles. Judging from the favorable comments received from every quarter, the new arrangement may prove eminently satisfactory. Mr. Dreher received the attention that his own experience and ability as a speaker commanded. He illustrated his remarks with lantern slides.

The talk comprehensively covered all phases of the application of various bronzes to machine tool components such as bearings, etc., as well as other modern industrial machinery. Mr. Dreher stressed the necessity for employing only clean, home scrap in preparing bronze mixes, and gave considerable time to the discussion of heading and gating of molds. Interesting items, such as the solidification of the metal and use of ceramic

(*Continued on page* 196)

OF all machine manufacturers:

66.3% will use Aluminum Alloys in their products in 1946, and **66.8%** of those who have used aluminum will use *more per machine* than prewar.*

90.7% will use sand castings, and of these **22.8%** will use *more per machine* than prewar. **48.1%** will use die castings, and of these **59.4%** will use *more per machine* than prewar.*

These data chart a trend which cannot be overlooked. They spell progress—modernization.

Have *you* any question regarding Aluminum Casting Alloys for *your* designs?

The members of this group invite inquiries regarding these alloys and their application—perhaps we can help you.

*****From a survey of design engineering executives in 1561 plants, made by Machine Design Magazine.*

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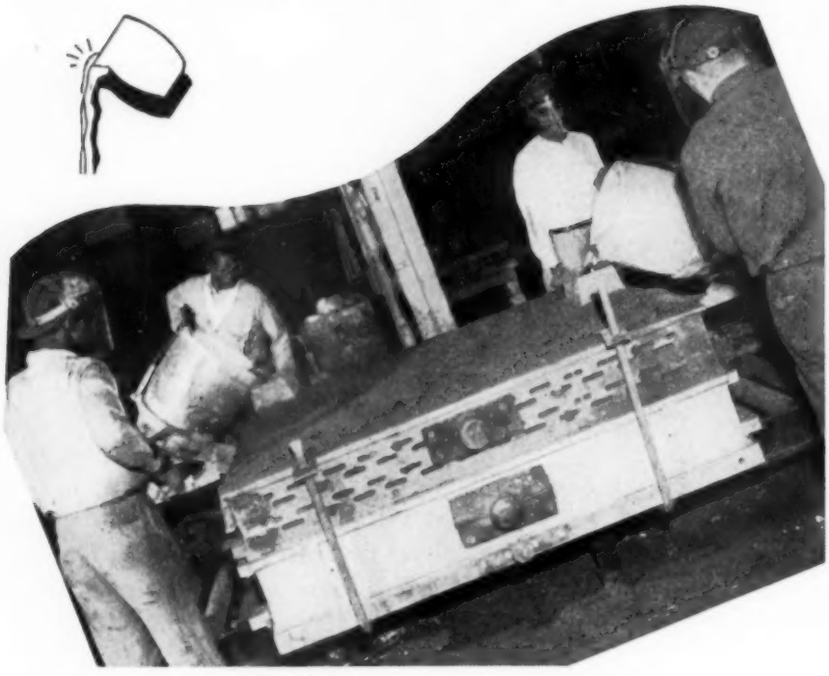
The National Smelting Co. *Cleveland 5, Ohio*	**Aluminum and Magnesium, Inc.** *Sandusky, Ohio*	**Federated Metals Division American Smelting & Refining Company** *New York City 5 and Branches*
Niagara Falls Smelting & Refining Corp. *Buffalo 17, New York*	**The American Metal Co., Ltd.** *New York City 6*	**General Smelting Company** *Philadelphia 34, Pennsylvania*

CRUCIBLE MELTING
In Tune with the Times



For a lighter piano with a cast aluminum plate. Metal melted in tilting type crucible furnaces, carried and poured with crucibles of 150 pound capacity. Photo courtesy Aluminum Company of America.

When you are confronted with unusual non-ferrous casting problems, crucible furnace melting is the most adaptable method—always.

Adaptable to the unusual, crucible melting is best always for the usual—your regular "run of foundry" work. In the coming "bread and butter" days, you can profit most by standardizing on Crucible melting. It is the wise foundryman's choice of today.

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(*Continued from page* 194)

risers, as well as non-sand molds, were mentioned. The speaker brought out some most interesting points concerning high tensile aluminum bronzes. A motion picture, produced by Ampco Metal, covering the high-lights of copper base alloys and entitled "Golden Horizon," added much to the success of the evening. — *James B. Morey, publicity chairman.*

Twin City

ANNUAL Christmas party of the Twin City Chapter of the AFA was held Dec. 20, with close to 400 members and guests in attendance. Ned Frost was chairman of the committee in charge of arrangements for the party, and was assisted by Clarence Becker, Shelly Pufahl, Paul Richardson and Howie Patton. A buffet dinner that included everything from ham and turkey to meat balls and shrimp, was served.

After the meal Bud Jacobson, master of ceremonies directed the entertainment, which was thoroughly enjoyed by all who attended. Drawing for door prizes was conducted by Paul Richardson and Dean Thom. Everyone knew it was Christmas when the prizes that had been donated by some twenty suppliers, were awarded. The evening will long be remembered as one of the highlights of 1945.—*J. W. Costello, reporter.*

Northwestern Pa.

NORTHWESTERN Pennsylvania Chapter of the AFA held two meetings during January. The Venango group of the chapter held its initial meeting Jan. 17, in the Franklin Club, Franklin, Pa. Herbert F. Scobie, chairman of the educational division of national headquarters at Chicago, addressed the group on the subject of "Co-ordination, Development and Educational Program of the AFA Pertaining to the Foundry Industry." Many points of interest were brought out concerning future plans of the association to enlighten both the general public and the younger generation on what foundries are doing and their necessity in our daily life. An interesting discussion period followed the presentation. Thomas Beaulac of the Chicago Pneumatic Tool Co., Franklin, Pa., one of the directors of the chapter, presided at this initial meeting.

Regular monthly meeting of the chapter was held Jan. 28, at the Moose Club, Erie, with 85 members in attendance. Lester B. Knight, consulting engineer, Chicago, discussed "Modernization in Foundries," and held the interest of all for over two hours. Supplementing his talk with slides showing improved meth-

(*Continued on page* 198)

Books You'll Want

If you want to broaden your knowledge of the foundry industry the following informative and instructive books will prove most helpful. Select the ones you need at once—use the convenient order form below.

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By Pat Dwyer. Sound foundry practice. How to prevent casting defects.

Modern Core Practices and Theories *Price,* $5.00
By Harry W. Dietert. A book devoted completely and in great detail to the production of cores. Will prove beneficial to every foundryman.

A.F.A. Symposium on Malleable Iron Melting *Price,* $3.00
Comprehensive, authoritative compilation. Just recently off the press.

Modern Blast Cleaning and Ventilation *Price,* $4.00
By C. A. Reams. Casting cleaning methods presented and discussed in detail. Also abrasive selection and use.

Tales from the Gangway *Price,* $1.00
A rollicking series of articles that contain practical solutions to everyday foundry problems. Written as only Pat Dwyer could do it.

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Second edition. Thoroughly covers the subject in theory and actual foundry practices.

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Complete data on present manufacturing practice and specifications of malleable cast iron.

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A new book, just off the presses that will prove invaluable to nonferrous foundrymen.

The Microscope in Elementary Cast Iron Metallurgy *Price,* $3.00
By R. M. Allen. Give a practical understanding of the microstructure of cast iron. Explains technique of the microscope, how to prepare samples.

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A new book covering all phases and latest developments of magnesium casting.

Foundry Sand Testing Handbook *Price,* $3.50
The accepted standard reference book on methods of testing and grading foundry sands and clays.

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NORTHEASTERN OHIO: A capacity attendance marked theannual Christmas party of the Northeastern Ohio Chapter, AFA, at Cleveland. (Photos courtesy Sterling Farmer, Sand Products Corp., Cleveland)

(*Continued from page* 196)

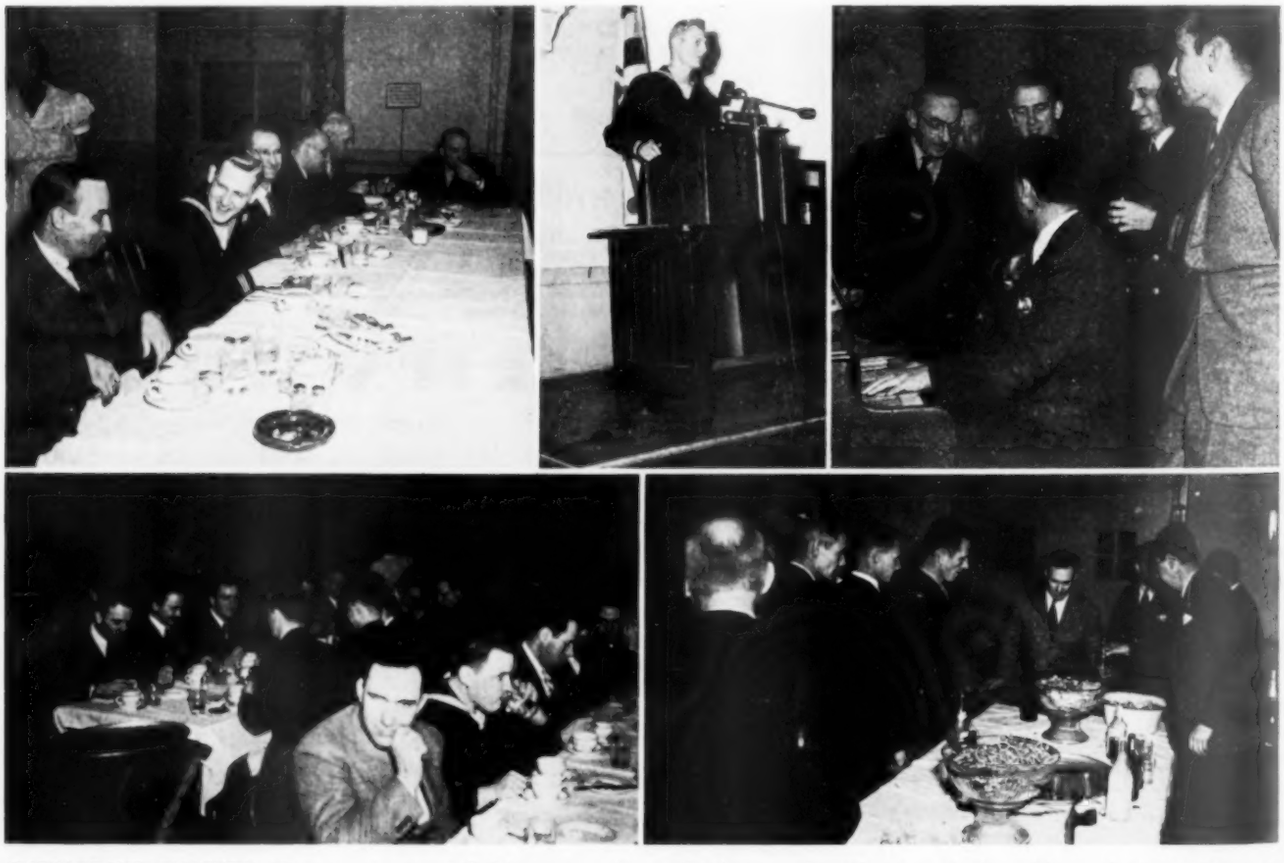
ods in foundries, Mr. Knight stated that modernization does not necessarily mean mechanism and that there are four important things necessary to analyze when modernizing a foundry: Organization, procedure methods, costs and facilities. He named facilities fourth because they are no better than the personnel of the plant, that is the men who operate them.

A number of out-of-town guests were present at this meeting, including C. B. Schneible of the Detroit Chapter, E. A. Hund of the Chicago Chapter, Charles Hague of the Buffalo Chapter, and a Chinese foundryman, Pei Chao of Shanghia, China, who recently received his Master's degree from the Massachusetts Institute of Technology and is visiting foundries throughout the United States

Roger W. Griswold, chairman, presided at this meeting and led the discussion period which followed the talk.

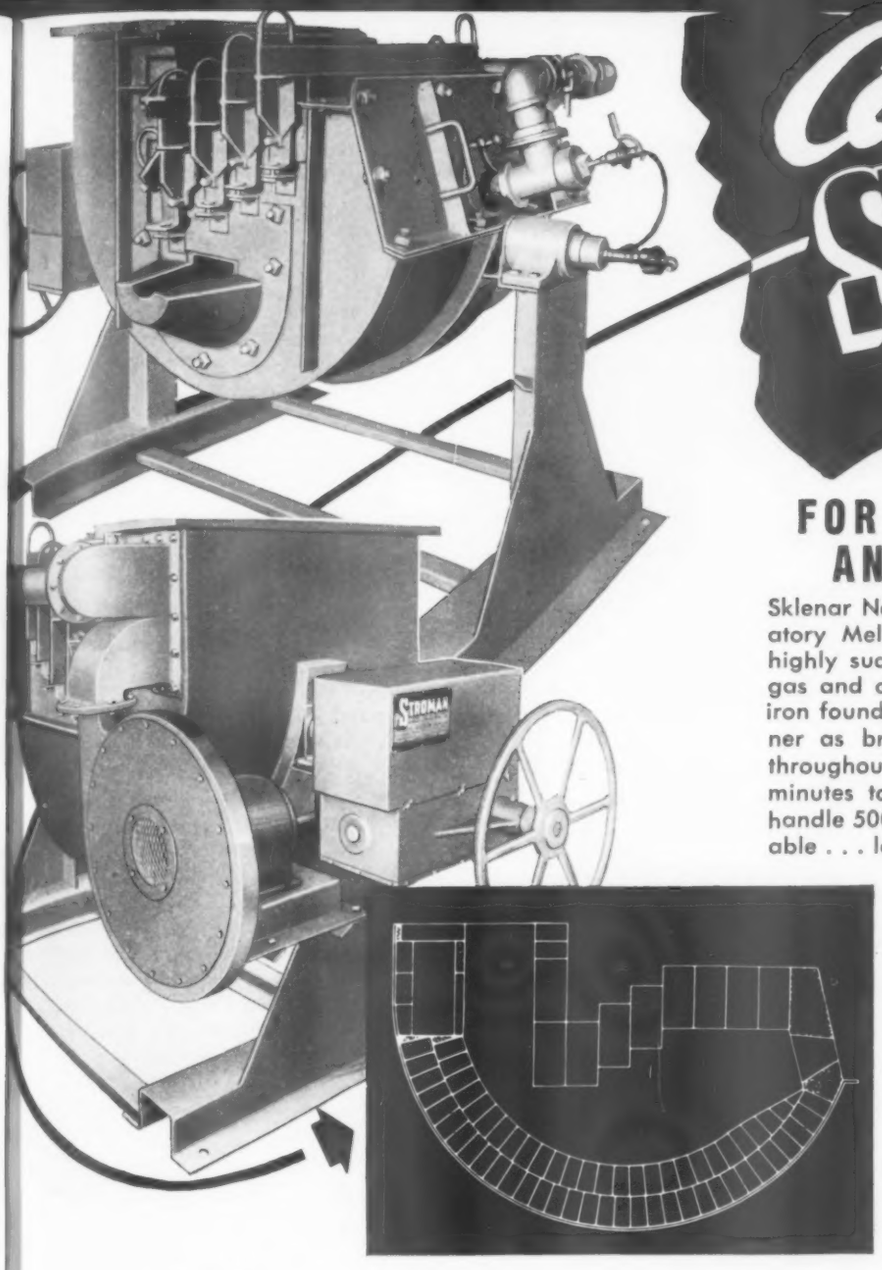
The Educational Development Committee of the chapter, consisting of Larry Dunn, General Electric Co., Erie, and

(*Continued on page* 200)



CHESAPEAKE CHAPTER: Scenes at recent Baltimore meeting of Chesapeake Chapter, AFA, addressed by William C. Wick (top center), Naval Research Laboratory. (Photos by Edwin T. Myskowski, Naval Research Laboratory)

Another STROMAN First!



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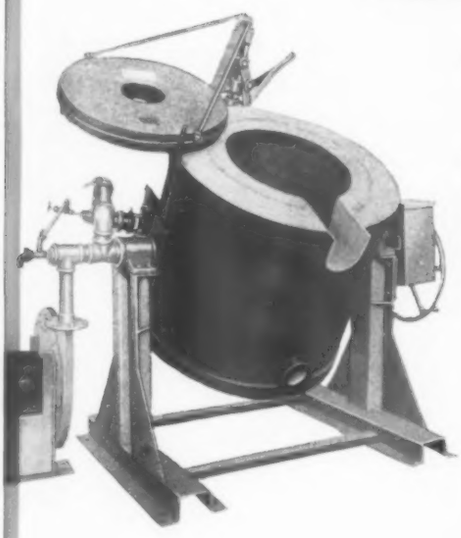
Sklenar Non-Crucible, Direct Fired, Improved Reverberatory Melting Furnaces have been tried and proved highly successful for making Grey Iron Castings, with gas and oil fire. By installing Sklenar Furnaces, grey iron foundries may now be operated in the same manner as brass foundries, by casting successive heats throughout the day. Average melting time is from 40 minutes to one hour per heat. Sklenar Furnaces to handle 500, 750, 1200 and 2000 pounds are now available . . . larger sizes to handle up to 10,00 pounds will be released at a later date.

In these remarkable furnaces metal is charged into a hopper which is also an exhaust from the combustion chamber. Here metal is preheated and melted at the throat of the hopper. Cold metal does not reach the molten bath. Charging is continuous. These furnaces will melt faster and give greatest fuel economy, as combustion chamber is heated by the same fuel used to melt the metal in the throat of the hopper. Available with either mechanical or hand tilt . . . oil or gas fire. . . . and remember Sklenar Furnaces handle non-ferrous metals perfectly too.



STROMAN MANUAL TILT CRUCIBLE FURNACES

For Brass, Bronze and Aluminum

Redesigned and engineered for better and faster melting as well as greater fuel economy. Many leading foundries find them indispensable. They will do your job better and effect many savings. Oil or Gas Fire. Capacities from No. 40 to No. 400 Crucible.

New Stroman Crucible Stationary Melting Furnaces

For Brass, Bronze, Aluminum and other non-ferrous metals

Sturdy, efficient and featuring the Stroman Push-Back Cover, these stationary furnaces are designed for peak production and greatest fuel economy. Oil or Gas Fire. Capacities from No. 20 to No. 400 Crucible.

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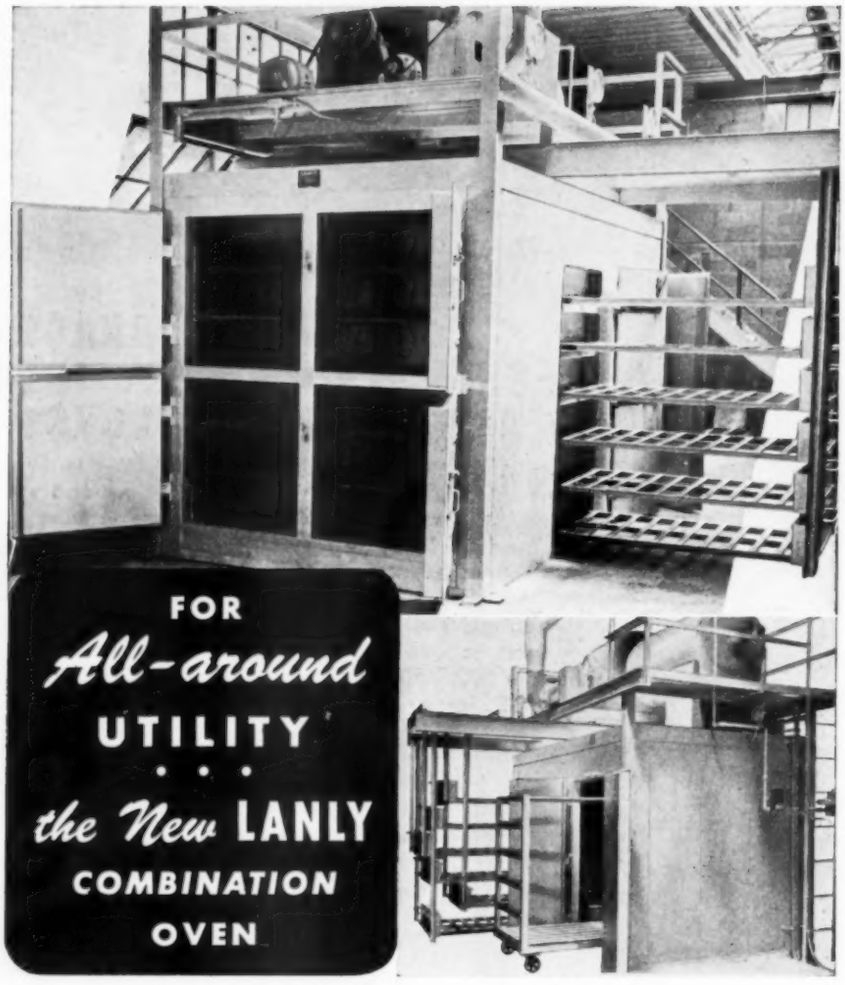
DIVISION OF

THE PETERSEN OVEN CO. 300 W. ADAMS ST. CHICAGO 6



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(*Continued on page* 202)

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Tell us the grade and number of the core oil you use, its color, your type and mesh of sand, and your oven conditions. Without obligation, we will prescribe the ideal grade of core oil for you.

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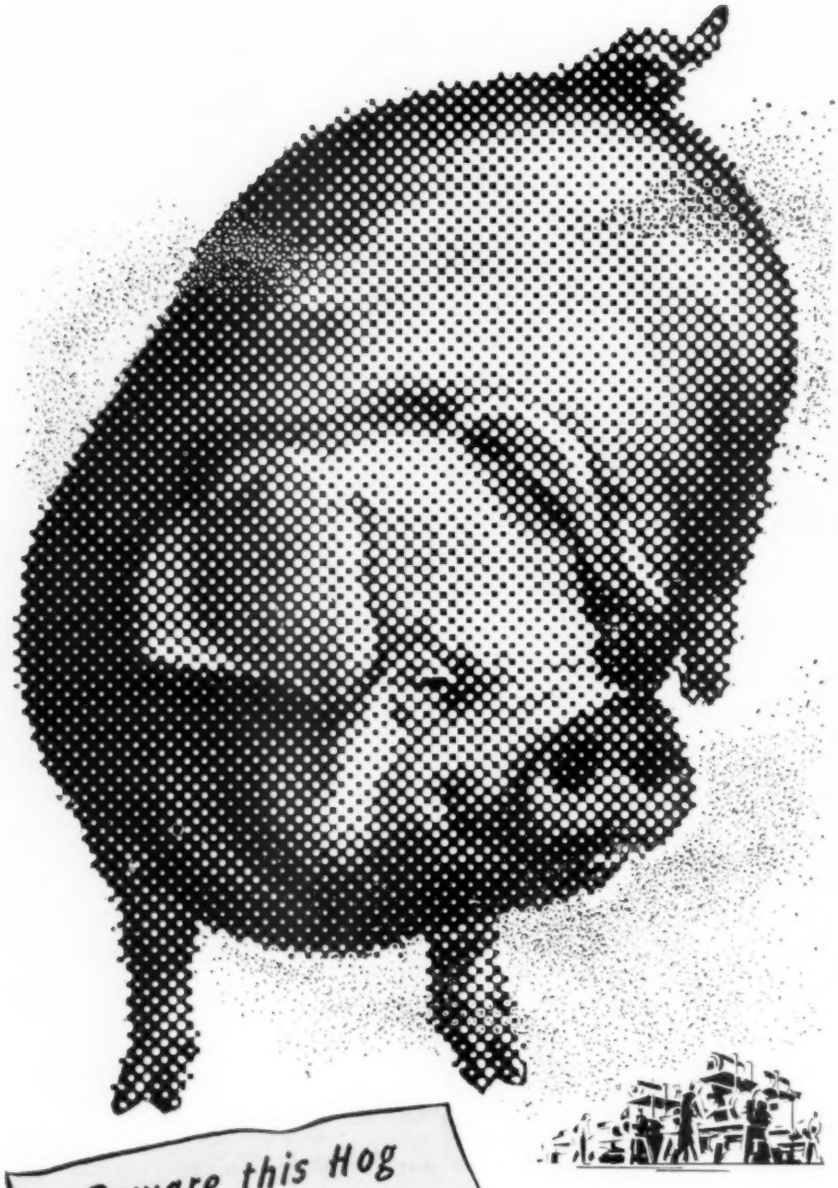

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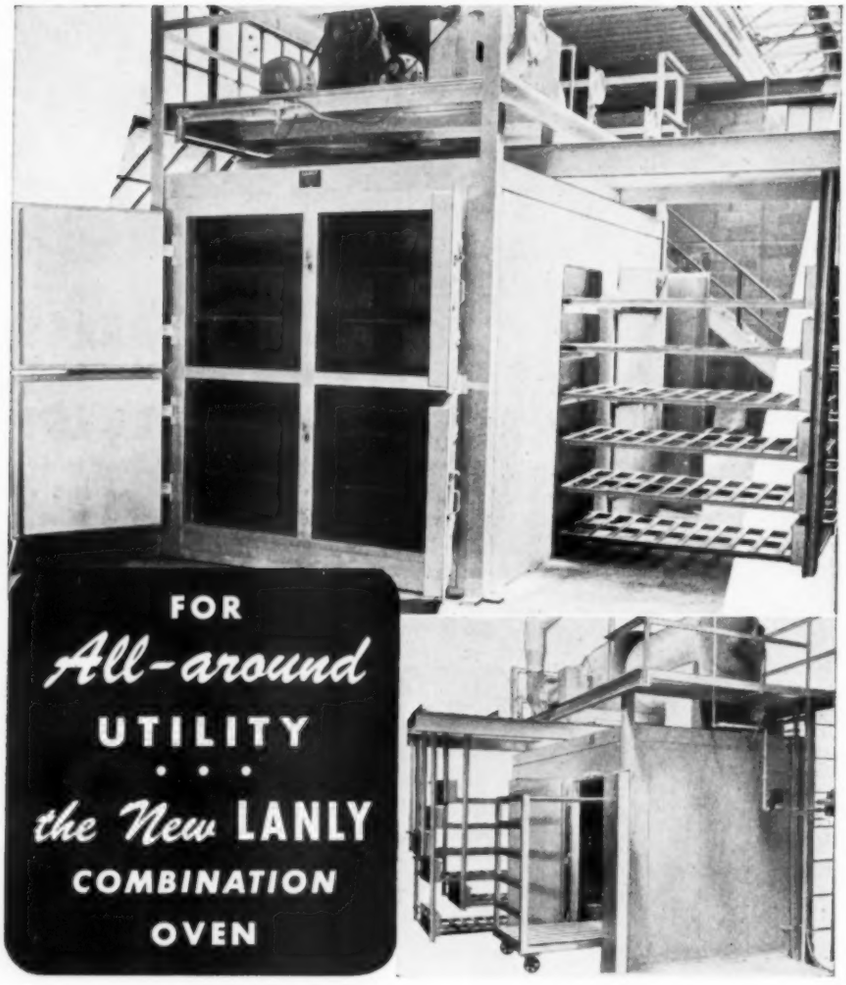

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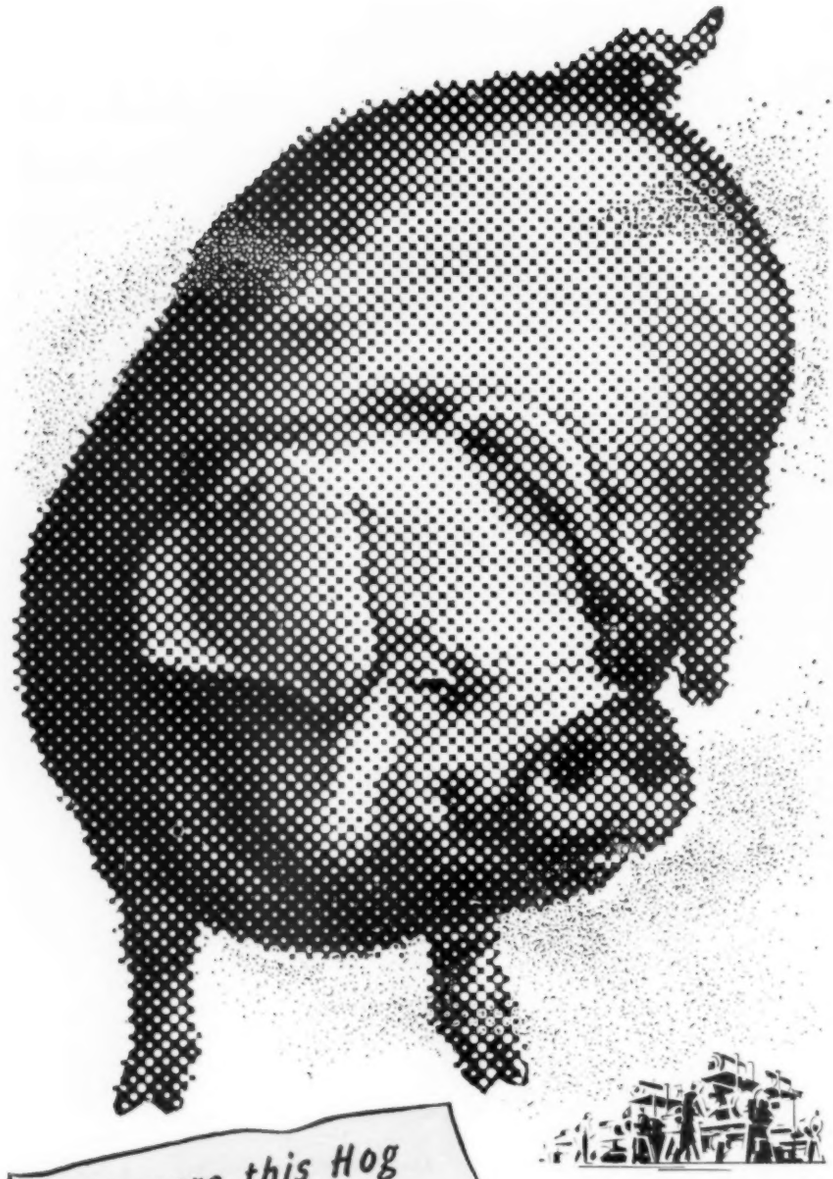

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The adventures of BILL

BY PAT DWYER
Drawings By RICHEY

A MILD discussion the other night on the peculiar names of people popping up constantly in foreign news prompted Bill to produce a manuscript which he claimed was sent to him by a relative in Nova Scotia. "Every one knows," he said, "that the McAdams are descended directly from the first Adam, but comparatively few people know that all the Scottish clans had representatives on Noah's Ark. This point was settled definitely in a recent opinion delivered by Andrew McNeish, an exceptionally well-read man. An drew reads the *Halifax Herald* and the *Evening News*, including all the items from local correspondents in Brule, White Hill, Mount Thom, Rocklin, Barney's River, Ecum Secum, Garden of Eden, Blue Mountain and up along. He absorbed items from the advertising section, fresh cows for sale, itinerary of noted stallions (with spirited illustrations), maids wanted for housework, etc. A low, scurrilous fellow once started a rumor that Andrew had been seen reading the *Eastern Chronicle* and the *Pictou Advocate*, but this vile canard was laughed at by friends of the doughty old warrior who had helped to elect Sir Charles Tupper and Sir John A. McDonald. Here is Andrew's version of the Noah's Ark story:

History does not give us very much information about Noah beyond the statement that he lived to be a very old man, and that when there had been a long continued dry spell, he knew for certain that sooner or later there would be a buster of a rain storm, and in all likelihood one hell of a freshet. To be prepared for it when it came he got busy and built a whale of a big boat which he called an Ark, after the Ark Royal, and in which he hoped to save enough of the Scottish nation to make a fresh start. There is no reference that I could find anywhere to Noah's last name, but from a mass of contemporary evidence it is clear that he was a McLean and came from Clyde Bank, or maybe the Broomielaw.

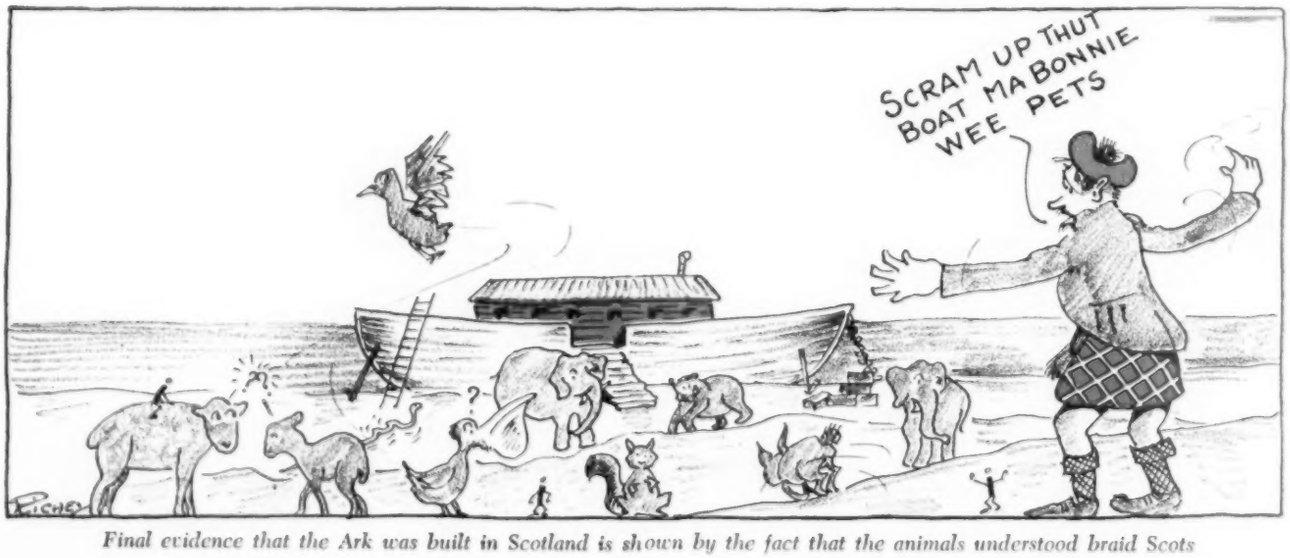
At any rate there is no disputing the fact that he was a shipbuilder by trade. From the fact that he was nearly 100 years old before he got his master builder's certificate, there is no doubt that the company and the yard where he was apprenticed to learn the trade must have been Scottish.

When Noah McLean finally was convinced that they were in for what they call in the Far West a *skookum* freshet he at once set about making preparations to be ready for it. There was no time to lose. The rains were due to begin in about 100 years, so every man, woman and child had to hustle if they didn't want to get their tail feathers wet. He called in all the men he could lay his hands on. McDonalds, Frasers, Rosses, Munroes, McLarens, Sutherlands, Marrays, McKenzies, Stewarts, McLeods, Crawfords, Chisholms, MacNeils, Morrisons, McCuishes, Camerons, McDougals, Campbells and no one knows how many others including the MacPhersons.

Everything had to be done in a rush before the rain started and they only had 100 years and a day to do it in. Noah McLean was a hard man, a driver. He knew his business. The way he roared up and down the Clyde, with his long white hair and whiskers flying in the breeze that he made, put the fear of the Almighty and the freshet into the hearts of every last living Scotsman. Noah was a great organizer and took pride in having the best available men about him for each individual job. He had an unerring faculty for selecting men specially adapted to fill each position.

One of the first jobs was to buy the materials needed to build the ark, and to buy food for the multitude of workers he had in his employ. He called in Big Archie McGregor (Archie og) and gave him full charge of the stores and supplies. Because of the early experience gained in the employ of Noah McLean the McGregors ever since have been great store keepers and timber merchants. When he needed a blacksmith he called in Johnny Cummins (Ian Dhu, or Black Jack) and put him to work at the forge. When he came into the shop and found Johnny trying to make a weld with iron too cold to join, he roared with exasperation, "By the hind leg of the Sacred Black Bull, Cummins, I'll make a blacksmith out of you if it takes me 100 years." Just take a look at the present day Cumminses,

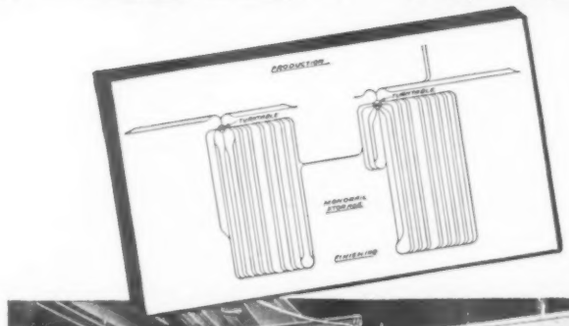
(*Continued on page* 206)

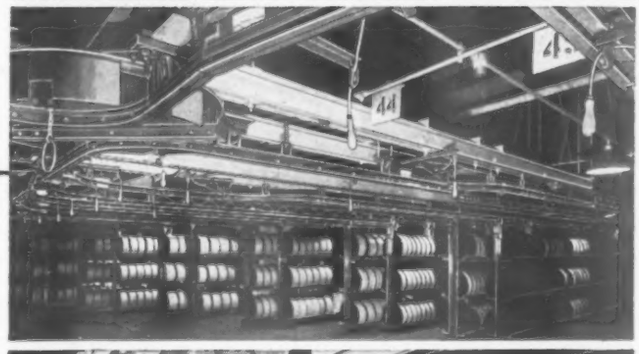


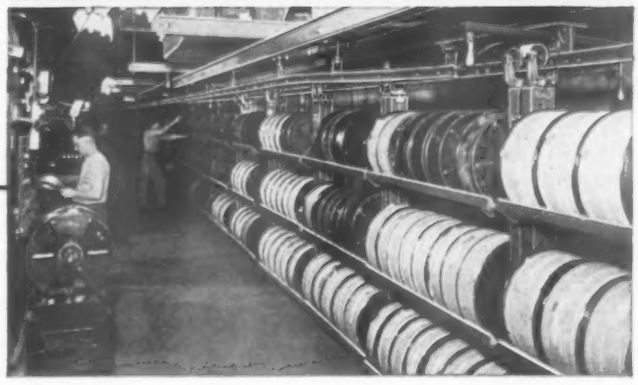
Final evidence that the Ark was built in Scotland is shown by the fact that the animals understood braid Scots

FLEXIBILITY

of AMERICAN MONORAIL EQUIPMENT Solves Difficult Handling Problems







Here is another of the hundreds upon hundreds of handling problems efficiently and economically solved by American MonoRail Overhead Handling Equipment.

THE PROBLEM: To eliminate manual handling of reels from production machines to storage, from storage to finishing, from finishing to storage or shipping as required.

THE ANSWER: The FLEXIBILITY of American MonoRail switching arrangements permits reels to move on carriers with no rehandling between processes. Ample live storage is allowed, permitting free movement between all processes.

What is your handling problem? American MonoRail Engineers come up with the answer to efficient and economical handling ninety-nine times out of a hundred. We invite your inquiries.

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVE. ● CLEVELAND 7, OHIO

Distributors Wanted for DOCKSON'S Maluminum FLUX

The master casting flux for BRASS—BRONZE—IRON AND ALUMINUM

Preferred by foundrymen for over 25 years because it—

- **Will not change your metal analysis.**
- **Gives off no offensive or stifling gases.**
- **Contains no silicon, manganese or phosphorus.**
- **Is not expensive.**
- **Allows lower pouring temperatures.**
- **Makes metal more fluid.**
- **Eliminates oxides and other non-metallic materials.**
- **Eliminates dross pile losses.**
- **Produces castings that machine and polish better.**
- **Used by U. S. Government, Railroads, Universities and hundreds of reliable foundries throughout the country.**

Free samples upon request

DOCKSON CORPORATION
3839 Wabash • Detroit 8, Mich.

(*Continued from page* 204)

the best blacksmiths in the country. The same with everything. Early and late he kept them at it for 100 years and a day. He made such good tradesmen out of them that their descendants have 'na forgotten to this day.

He kept John Marshall working so long with the broadaxe that when he finished hewing a beam, it was so straight and smooth that they couldn't plane it. The surface was so polished that the knife on the jack plane would not catch. The Marshalls are still the best broadaxe men in the shops, or in the woods.

When the men got restless and wanted to go into town for a show or a drink, Noah called in Angus MacDougal. "Angus," says he, "you get busy and make a good fiddle to keep the boys entertained. Keep up their spirits with the 'Sailor's Hornpipe,' 'McLeod's Reel,' 'Keelrow,' 'Charlie Is My Darling,' and 'All Around the Cobbler's Bench the Monkey Chases the Weasel,' and other good lively stuff." Angus goes out and

May end in a duet or duel

gets some nice pieces of maple and some of the you-know-what from a cat. Hair from a horse's tail served for a bow and Angus played for the camp every night. The MacDougals are still fiddling—and carrying off all the prizes.

Noah started Tammas Sutherland publishing the *Arkwright Free Press.* It had to be free. He could not get any subscribers if they had to pay. Sutherlands still are at the head of the list as newspaper publishers.

What with gathering up two of each of all the bugs and beasts in Scotland to put in the ark before the rains started, the last four or five years were the busiest of all. Noah called Bill Bailey and says to him "Bill," says he, "you get busy and gather a pair of all the beasts and birds and bugs and animals in Scotland. Pack them in the warehouse and have them ready to load just before we pull up the anchor and set out for foreign parts." Bill scoured the countryside for every living thing he could lay

(*Continued on page* 208)

It's the FIFTH ROYER for this TEXAS FOUNDRY

The "NC-2" Royer Sand Conditioner pictured in operation at Oil City Brass Works, Beaumont, Texas, is No. 5 for this leading southern non-ferrous foundry. Previous installations include two Model "NDP" and two other "NC-2" Royers.

Repeat orders constitute the most conclusive proof of the value of an equipment, and over 51% of the more than 7,300 Royers in service today represent repeat purchases. Very few of these are replacement orders, as Royers have a reputation for long time operations — as many as twenty years — in some foundries. Not so long ago, two old Royers were "discovered" in interior China — still operating, although no factory replacement parts had been procurable for the entire war period.

Royer users order more Royers because they save labor and assure properly conditioned sand at minimum **cost. In a few minutes time one man with a Royer can prepare enough sand to keep a crew of molders busy for hours. Regardless of the condition of the heap sand that is shoveled into a Royer, it comes out cooled, open, thoroughly mixed and refuse free—the kind of sand that results in better molds, fewer skids, run-outs and drops and smoother finish castings that require less cleaning time.**

Get this book!

There's a Royer of correct type and size for every foundry requirement. All are shown in Catalog No. 744. Send for this informative book on low cost sand conditioning.

ROYER

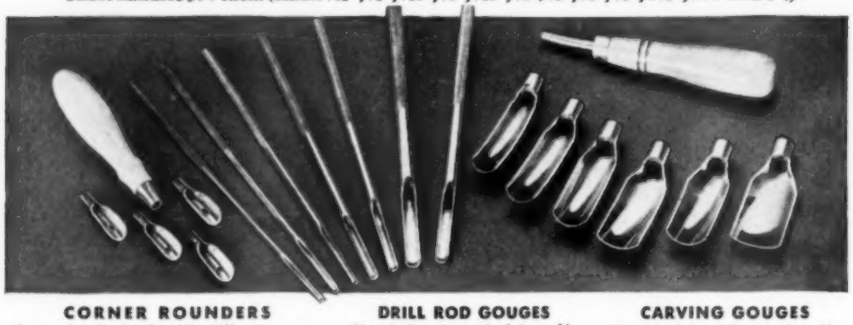
FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

KINGSTON, PENNSYLVANIA

WELLMAN *Detachable* GOUGES *and* CARVING TOOLS

Twelve blades interchangeable on straight, curved and short shank handles give you 36 tools for the price of a dozen! Blades are made of the finest steel, beautifully finished—tools that you will be proud to own! Used by thousands of pattern-makers! A complete set of 12 tools with 3 handles priced at $13.20 net. Separate gouges 7/32", 1/4" radii $1.10 each. Other radii $1.21 each. Long handles 45¢ each. Short handles 35¢ each. (Radii 7/32", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1 1/8", 1 1/2" and 4".)



CORNER ROUNDERS

Sets of 1/8", 3/16", 1/4", 3/8", diameter Cutters and Handle $2.20 net per set. Set of nine including the above set with 1/2", 5/8", 3/4", 7/8" and 1" diameter Cutters $5.00 per set. Separate cutter or handle 50¢ each.

DRILL ROD GOUGES

Shank has knurled handle end. No extra handles required. Extra gouges 1/16" and 5/64" radii 95¢ each; 3/32", 7/64" and 1/4" radii $1.05 each; 5/32" and 3/16" radii $1.10 each.

CARVING GOUGES

Six blades with one handle only (5/16", 3/8", 7/16", 9/16", 13/16" and 1 3/4" radii) $6.60 per set net. Extra blade $1.21; Extra handle 45¢ each net.

The WRITE FOR TOOL PRICE LIST "W"

WELLMAN PRODUCTS

Ask about "CELASTIC" Lagging Material!

Company E. 49th at SUPERIOR CLEVELAND 3, OHIO

(*Continued from page* 206)

his hands on. By the time the ship was ready the warehouse was packed with an enormus menagerie. While he was away on these missions his wife sat in a rocking chair on the front porch and sang "Wont you come home Bill Bailey, Won't You Come Home!" She was quite a whistler, too.

It was always a source of the keenest delight for the younger element along Clyde bank to see Bill Bailey coming down from the highlands with his day's quota for the menagerie. Usually his clothes were flying in ribbons from chasing wild highland cattle and wilder sheep through the hills and clumps of Scottish thistles almost up to his oxters. He might have a fire breathing highland bull in one hand and a cantankerous black face ram in the other, while his sporran was packed full of different kind of wild bees, wasps, hornets, each busy with a poisoned stingaree trying to persuade Bill to open the bag. And that is how it come, dear children, that when Barnum tried to run a circus, he could not make a go of it until he got Bill Bailey to go in with him.

"Before reading the remainder of this interesting hunk of historical lore," Bill said, "touching on some examples of skillful axe handling and the ingenuity displayed when the ark sprung a leak, I think it is only fair to direct attention to one glaring omission. Every art and craft is given full credit with the exception of the foundry. One possible explanation is that the old wooden bumboat with no definite destination or stopping places listed on the program, had neither anchors nor anchor chains. And of course she had no engines. The other and more likely explanation is that the writer did not know whether castings grow from seeds planted in the ground, or are dug out of an iron ore quarry and whacked into shape with a hammer and chisel. We never mention the subject among ourselves, but castings occasionally are produced that cause even the elect to wonder if they had come out of a quarry. I felt very low indeed on one occasion. A sharp tongue master mechanic gazing at one of these abortions asked me sarcastically if it was semisteel or semistone."

"A hurried glimpse into the crystal ball," I ventured, "does not show any medal coming to you for the present job. Noah did not have any foundrymen on board the ark for the simple reason that the old tub was daubed with pitch inside and outside. Noah was afraid the gang would drop the bottom some night and set her afire. History is discreetly silent on the point, but in all probability the old boy did not carry any fire insurance. He had trouble enough keeping the—ah—ash hoist working along the sides, without having to watch a gang who lit their pipes with the end

(*Continued on page* 210)

showing results **YOU** *can get with...*

DESPATCH BATCH TYPE CORE-BAKING OVENS

Baking 4 times as many cores *at 1/5 the previous fuel cost* is a record repeated every day at Prospect Foundry, Minneapolis. Check these comparative figures supplied by Prospect Foundry:

With old oven (one batch)		With DESPATCH oven (4-6 batches)	
Fuel	$1.78	Fuel	$1.08
Labor	$3.09	Labor	
TOTAL	$4.87	TOTAL	$1.08

Here are the other oven advantages reported by Prospect Foundry:

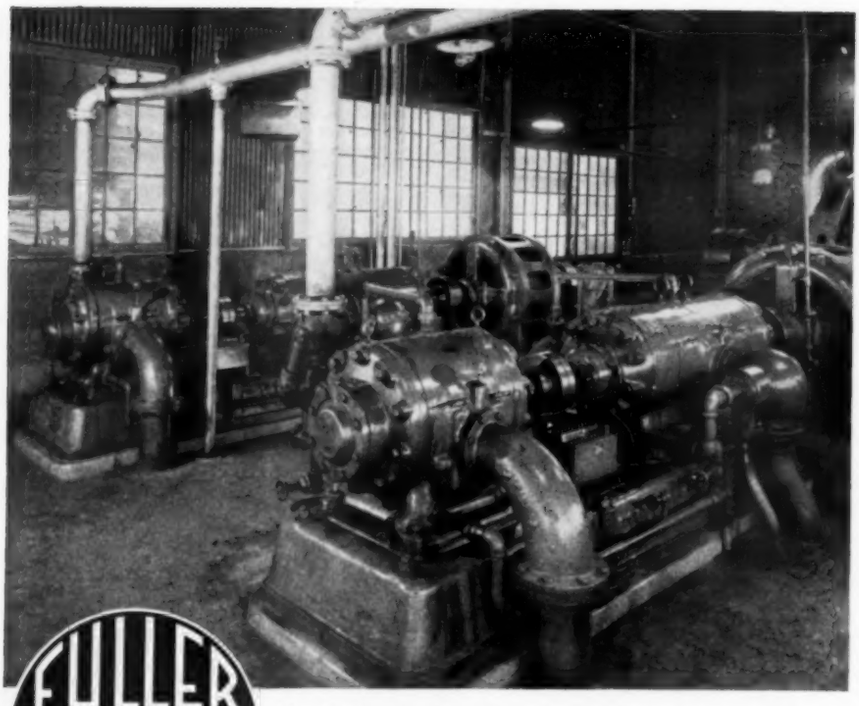
1. FAST, UNIFORM BAKING—eliminates *all* green cores (rejects ran as high as 26% before)
2. 48% SAVING IN CORE OIL.
3. ELIMINATION of oven smoke, soot, and dirt.
4. REQUIRES LESS LABOR. Easier to load and unload. Automatic heat control saves watching.

You can get comparable results in your foundry with an automatic, convection-heated DESPATCH oven. Available in many standard types and sizes, gas or oil fired.

Prompt Delivery, Immediate Installation

WRITE TODAY FOR DETAILS

DESPATCH OVEN COMPANY MINNEAPOLIS 14 CHICAGO 1



FULLER ROTARY COMPRESSORS

Two Fuller Rotary Two-Stage Compressors. Capacity each, 1665 c. f. m., 100-lb. pressure.

Another Steel Mill Installs Fullers

Write for Bulletin C-5

Steel mill superintendents have learned that Fuller Rotary Compressors really fill the bill in their business. Hundreds of them are now in use throughout the industry. They're easy to install, don't require large, heavy foundations with relation to capacity when compared with other types of compressors. Then too, Fullers give them the original capacities for the life of the machine.

Fullers have a minimum of moving parts, only three: rotor - bearings - blades. Really built for severe service. And, when repairs are necessary, easy access to the machine allows the work to be done with minimum time loss.

FULLER COMPANY
CATASAUQUA, PENNSYLVANIA

Chicago 3 - 1144 Marquette Bldg
San Francisco 4 - 421 Chancery Bldg
Washington 5, D. C. - 618 Colorado Bldg.

C-127

FULLER
PIONEERS OF HIGH-EFFICIENCY ROTARY COMPRESSORS

(*Continued from page 208*)

of a rod dipped in a pot of metal and who thought it was a great joke to blow out all the windows by dropping the bottom into a pool of water."

"Did you ever hear of Shake-em-up McCarthy?"

"No," I admitted, "Who was this shake-em-up fellow and what are you dragging him in for? He may have been a Mac, but certainly he was not fisted with the Scottish crew of Noah's ark. Was he by any chance a relative or connection of the famous little weasel Charlie?"

"Shake-'em-up ran a shop in Chicago about the time of the World's Fair, or, as it is sometimes referred to, the Columbia Exposition. In the course of time the windows acquired such a coating of dust and grime that the molders had to creep around like moles with a miner's lamp stuck in the hat band. Shake-'em-up's feelings were cruelly hurt one day when a new vice president on a tour of inspection, commented sharply on this apparent lack of competency. For about a month Mac tried to borrow the maintenance crew to clean the windows. They were too busy polishing the windows of the office, the machine and other shops. Then, just to show you how the just and patient man is rewarded, old mother nature took a hand in the game. Out in the yard one night the pan for catching the cupola drop was half filled with rain water. It was shoved under the cupola as usual next day and when the bottom dropped the explosion blew every pane of glass out of the building!"

"So what?"

"I was wondering if a certain eminent citizen had something like this in mind when he asked me recently if I knew of any records showing efficiencies of different types and sizes of iron and steel melting furnaces using fuel oil. I did not have any records on this subject, and I was rather curious to know what value the information would have for any person even if it was available.

"The cupola is the cheapest, most efficient and most economical device for melting iron," I told him, "but it cannot be operated on fuel oil. Some experimental work has been done, but no satisfactory results have been achieved up to the present. Air furnaces burn coal either in the natural or in powdered form. The open-hearth furnace can be used to melt iron and can be fired with oil, gas or powdered coal, but the process is economical only where large quantities of metal are melted and where the furnace is operated continuously day and night. Several small types of chamber furnaces using either gas or oil are on the market principally for melting nonferrous metal. Steel is melted in cruci-

(*Concluded on page 212*)

If You Use Aluminum Casting Alloys You Will Want These Facts About

Allcast...

Important Advance In Aluminum Metallurgy

Allcast is a high quality, general purpose aluminum casting alloy whose properties

1. successfully meet a large number of casting requirements.

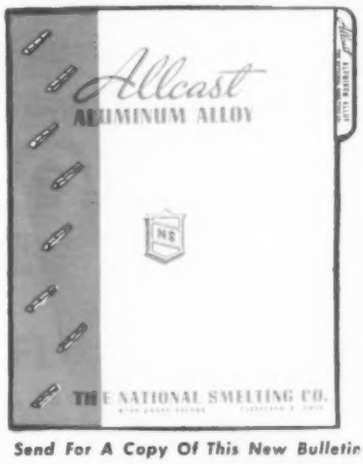
The mechanical properties and foundry characteristics of Allcast are as good or better than those of the standard high

2. strength aluminum casting alloys used in aircraft construction during the war.

Allcast is attractively priced and therefore affords a substantial savings to foundries and manufacturers who will

3. not sacrifice quality, but who nevertheless must remain competitive.

Write and we shall be glad to send a copy of the new Allcast bulletin or have one of our field representatives call by appointment.



Send For A Copy Of This New Bulletin

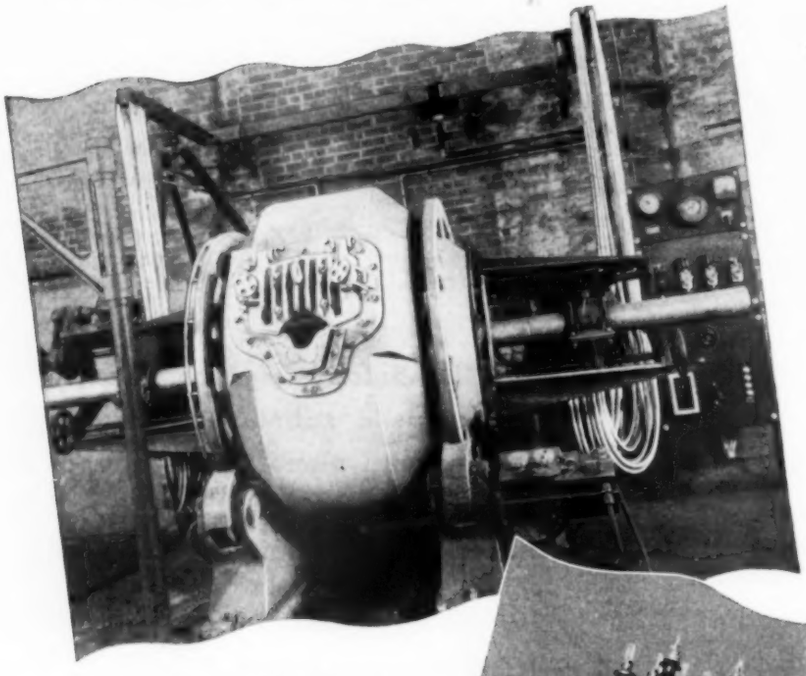
THE NATIONAL SMELTING COMPANY

6706 GRANT AVENUE • • • • • CLEVELAND 5, OHIO

NATIONAL NS SMELTING

Detroit & Kuhlman

THE UNBEATABLE ELECTRIC FURNACE and TRANSFORMER TEAM



Type AA, 1000 lb. Detroit Rocking Electric Furnace.

Detroit Rocking Electric Furnaces melt ferrous or non-ferrous metals fast and to desired analyses under ideal working conditions. Kuhlman Furnace Transformers are specially designed for electric furnace power requirements. Combine the two in your foundry and you have the ideal set-up for pouring heat after heat of consistently higher quality metal. The Type AA, 400 KW, 1000 lb. conical shell Detroit Electric Furnace and the Kuhlman 531 Kva Furnace Transformer, illustrated, form a typical installation. In melting grey iron, this modern furnace will produce 5 tons of metal per 9 hour day; it duplexes a ton of molten iron every 30 minutes. The Kuhlman Transformer, engineered for the primary voltage and frequency of the power supply available at the installation, is designed with external voltage and reactance tap-changers which permit easy adjustment for best arc characteristics. Our engineers will be glad to study your melting requirements, without obligation, to determine the money making possibilities of the correct Detroit Electric Furnace in your foundry

531 Kva Kuhlman Furnace Transformer.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

(*Concluded from page* 210)

bles, electric furnaces, open-hearth furnaces and bessemer converters.

"Oil can be applied only in two of these processes, crucible and open hearth. Briefly, fuel oil cannot be used in the majority of furnaces. Where it can be used, its adoption depends on location, market conditions and other factors. For example, oil cannot compete with natural gas in certain sections or with producer gas in other places. Frankly," I told him, "I thought he was chasing a willow-the-wisp. The application and cost of fuel oil is one, but it is not the only factor in the selection of a melting medium. Choice is determined arbitrarily by many other factors. For example metal might be melted economically by the electric process in some favored location where current costs ½ cent per kw. What use is that information to a man setting up a furnace in a place where the cost is 3 or 4 cents or more."

Conference Program Continued

Training department, Caterpillar Tractor Co., Peoria 8, Ill., has published a new supervisor conference booklet covering the program planned for the current year. Emphasis is centered on mechanical problems, with new conferences pertaining to effective speaking, practical psychology, leadership and reports for cost control added to the programs conducted in the last three years.

Current conferences include: job instructor training, job methods training, job relations training, supervisor routine, products at work, basic effective speaking, economics of industry, conference leading personality traits, and better English. Past conferences which will be rescheduled by request include: foundry practices, machine shop practice, welding, accident control, quality control, accounting, time study, heat treatment and labor legislation affecting supervisors.

Acquires Malleable Iron Foundry

International Harvester Co., Chicago, has acquired the malleable iron foundry of the General Malleable Co., Waukesha, Wis., which includes 12 acres of land, with about 160,000 sq ft of foundry space. The malleable division employs about 300 men, who will be retained by International Harvester Co. The aluminum and gray iron foundries of General Malleable Co. are not included in transfer and will continue to be operated under former management.

Listen!

Our Customers Say "Better Castings" with Famous CORNELL CUPOLA FLUX

This amazing metal cleanser shortens heats, makes iron hotter and more fluid, too. Also keeps cupolas clean, protects life of brick in melting zone, gives cupolas a clean drop, and practically eliminates maintenance. The cost?—but a *fraction* of a cent per average size casting. *Write for BULLETIN.*

The CLEVELAND FLUX Company

1026-1036 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Brass and Aluminum Fluxes, Since 1918

EXCLUSIVE ADVANTAGES OF SCORED BRICK FORM

Takes but a few seconds to use. Promotes accurate measurement. You simply toss in one brick or break off a briquette (quarter section) for each 500 pound charge iron in the cupola. None blows out with the blast—it *stays* in melting zone until *entirely* consumed.

FAMOUS CORNELL FLUXES
Trade Mark Registered

Write for Bulletins ➡

Famous CORNELL ALUMINUM FLUX

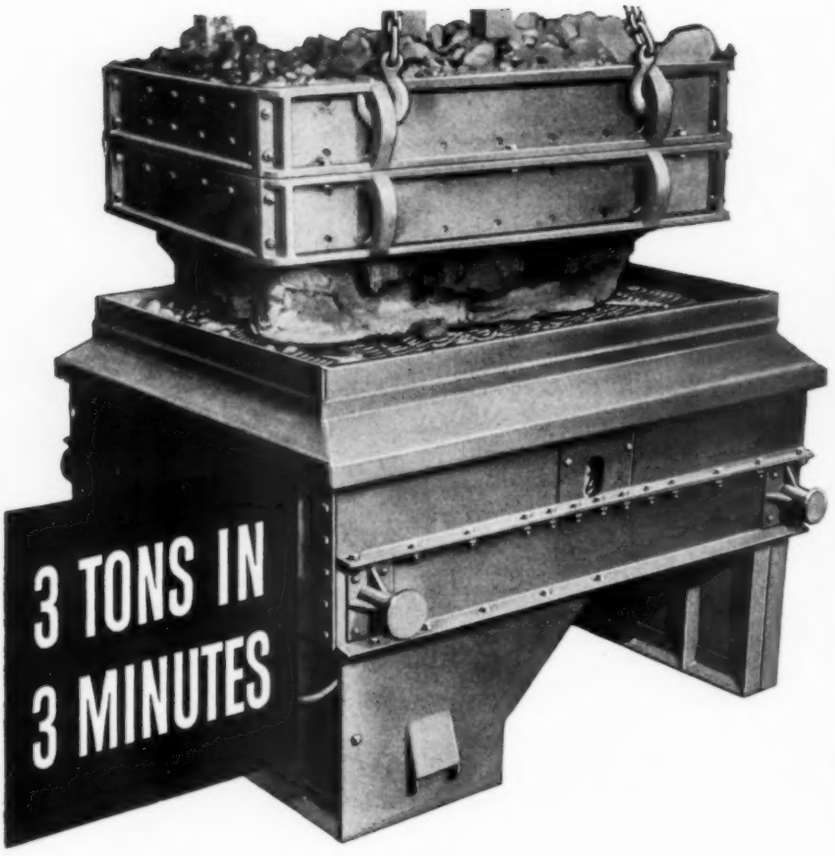
Produces clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections are poured. Castings take a higher polish. NO FUMES! Exclusive formula prevents obnoxious gases. Metal does not cling to dross.

Famous CORNELL BRASS FLUX

Makes metal pure and clean, even when dirtiest brass turnings or sweepings are used. Produces castings which withstand high pressure tests and take a beautiful finish. Saves considerable tin and other expensive metals. Crucible and furnace linings are preserved.

Famous CORNELL LADLE FLUX

Place a few ounces in bottom of ladle, then tap cupola. Metal is thoroughly cleansed, foreign impurities are easily skimmed off. Ladles are kept clean, there is less patching and increased ladle life. Metal temperatures are retained during transfer to molds.



. . . and that is just one example of how a Floatex Shakeout, "Job-Engineered" by Robins, can help solve one of your most vital foundry problems . . . pressing time schedules for producing castings for civilian use. Operators of large and small foundries alike, in all parts of America, have found the Robins Floatex Shakeout the most effective solution to their shakeout time problems.

You can increase foundry production, insure low flask maintenance, and keep employees more contented and efficient by taking advantage of this "Job-Engineered" answer to pressing production schedules.

A note or a telephone call will bring a Robins job-engineer to your desk who is fully qualified to help you solve your shakeout problems.

Robins Floatex Shakeouts are made in Portable models for loaded flasks weighing up to 17 tons; in other models, up to 100 tons or more—non-discharging and self-discharging types; with and without flask loaders.

ROBINS
CONVEYORS INCORPORATED
PASSAIC, NEW JERSEY
Division of Hewitt Rubber Corporation

AMERICA'S ONLY COMPLETE MATERIALS HANDLING SERVICE

Hewitt and Robins unite to offer you 136 years of combined experience in Job-Engineered industrial rubber products and machinery for every materials handling problem you may have.

INCREASES MALLEABLE IRON CAPACITY

(*Continued from page* 93)

System for 1, 2, and 3 conditions hopper sand only. All points of sand transfer, shakeouts and cooling areas are covered by dust hoods from which heavy duty fans remove all air, smoke and dust to wet type cleaners. Atmosphere conditions in the plant are exceptionally good.

Metal is delivered in large capacity insulated ladles by an electrified monorail system to the several pouring stations serving the units. Turntables at the stations insure a full ladle at all times, with an empty available for return to the holding furnaces.

A cupola and holding furnace duplexing operation handles the melting. One or both of two cupolas lined to 60-in. takes care of the melt. Metal may run from either or both cupolas to one or both 35-ton holding furnaces conventionally fired with pulverized coal. A standby fuel oil system is contemplated. Pulverized coal is prepared in a central plant originally serving the entire plant including annealing.

Present Original Features

Method and equipment for making up the cupola charges present several original features, including three revolving platforms, one 40 ft in diameter at each end of the outdoor charging deck and a smaller one under the deck. The south platform, Fig. 1, with a curb about 2 ft high around the perimeter, receives all the sprue and scrap from inside the foundry. The material arrives on a conveyor belt and falls on the platform in a continual stream. With the platform revolving at slow speed the material is built up into a circular mound or windrow of approximately uniform height. A magnet suspended from a hoist which extends over both platforms transfers the sprue and scrap to a circular opening in the main deck, as shown in Fig. 2.

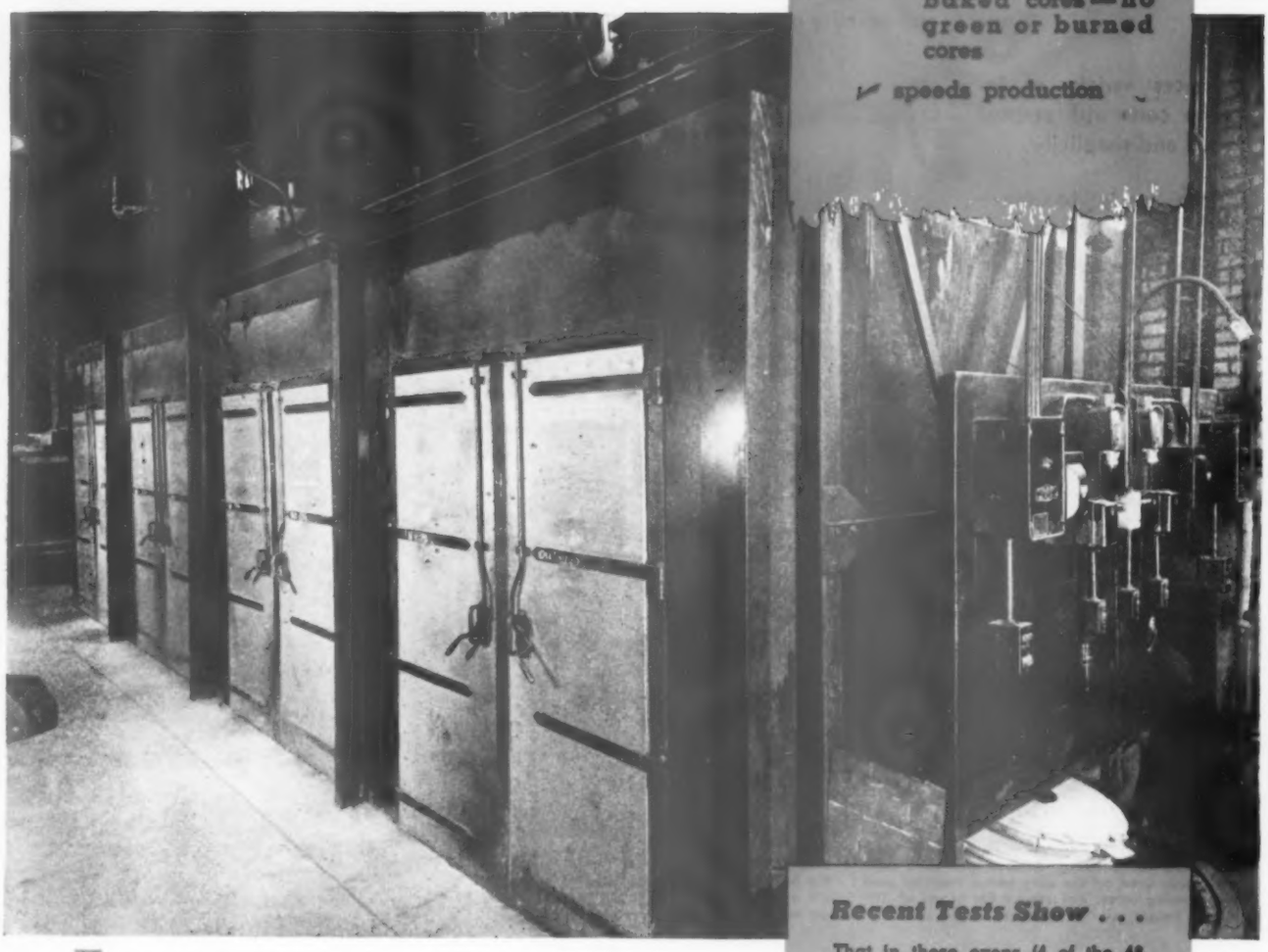
A similar arrangement brings pig iron and miscellaneous scrap from the north platform, where a supply is maintained by a locomotive crane operating on a track in the stock yard. Three cupola weighing buckets arrive in regular sequence on the third or central revolving platform under the main deck and are automatically spotted in turn under each of the three openings in the upper deck. The operator with a scale in plain view drops the required amount of pig iron and foreign scrap through the first chute

(*Continued on page* 216)

BATTERY OF

4 MAEHLER CORE OVENS

- ✓ reduces baking time
- ✓ produces more evenly baked cores—no green or burned cores
- ✓ speeds production



INEFFICIENT core ovens can play havoc with your production schedules as well as your operating costs. Maehler re-circulating air heat ovens can help you keep these important factors in line. The re-circulating air heat principle, originated by Maehler, assures you of *perfect* heat uniformity resulting in more uniformly baked cores, elimination of core loss and shorter baking time.

The installation shown above at the Howard Aluminum Foundries, is an example of how today's top-flight foundries are using Maehler ovens for faster core baking. These Maehler gas-fired units handle the baking of the largest cores in three hours at 450° F. (These cores measure about 31 inches square, 10 inches deep through center and 4½ inches deep around edges.)

Maehler core and mold ovens are available in a complete range of gas fired, oil fired and electrically heated units for producing better, more evenly baked cores—faster at less cost. Call a Maehler engineer today or write for latest bulletins.

THE PAUL MAEHLER COMPANY
2200 W. Lake Street, Chicago 22, Illinois

Recent Tests Show . . .

That in these ovens (4 of the 48 Maehler units at the Howard Foundries in Chicago) cores for aluminum castings are baked with a maximum degree of uniformity. One of the ovens accommodating 8 large cores (31 inches square) on 2 large racks requires one hour and five minutes to reach a temperature of 450° F. It requires only three hours of baking time at this temperature. Reports show that temperature uniformity is virtually perfect.

MAEHLER

Industrial Ovens and Furnaces for Core Baking, Mold Drying, Heat Treating, Enameling etc.

NEW and UNIQUE! » THE CARTRIDGE BENCH CORE BLOWER

*Users report remarkable increases in quality and quantity of production

Produces variety of intricate cores with unusual speed and simplicity.

Comes ready to use—virtually no installation cost.

Can be operated with unskilled labor — extremely easy to use.

If you make cores 2 lbs. or under—this unit ideally suited to your use.

Designed by two practical foundrymen.

WRITE for complete details and new booklet.

Core boxes can be made very light, in most instances bench equipment now used can be converted for blowing. Almost any sand now commonly used on the core bench may be used for blowing cores. Adjustment for boxes of different height, size and shape made instantly.

To operate, core box and cartridge are held down by pressure handle while left hand operates blow valve. After core has been blown, the box is pulled forward and cartridge is lifted off and the work of drawing core is completed on base of machine.

FILLS NEED FOR SIMPLE, FLEXIBLE CORE BLOWER

The New *Redford Cartridge Bench Core Blower* has met with enthusiastic acceptance by foundrymen because it supplies an important need in the foundry for an efficient, low-cost method of blowing small, intricate cores. It requires no large volume of air and readily lends itself to handling a variety of core boxes. In fact, they tell us that it is the ideal method of making cores in single or gang boxes requiring a maximum of 2 lbs. of sand.

SAND CARTRIDGES AVAILABLE IN 8 STANDARD SIZES

Blower comes complete, ready to use. Each blower provided with one Size "C" sand cartridge which is adaptable to a large range of core boxes. Cartridges are available in seven additional standard sizes and special sizes furnished where needed.

★ Cartridge Bench Core Blowers

Redford IRON & EQUIPMENT CO.

Phone: REdford 8610

21315 West McNicholls Rd. Detroit 19, Michigan

(*Continued from page* 214)

into the bucket and repeats the operation with shop sprue and scrap through the second chute. The bucket then moves in turn under the remaining chutes and receives the proper amount of coke and limestone.

The coke storage bin erected above the platform has a holding capacity of three carloads, while a second bin holds a good quantity of limestone. A pneumatically-operated gate at the bottom of each hopper controls the flow of coke and limestone into the charging bucket resting on the revolving platform underneath. The completed charge is dumped automatically into the skip bucket directly beneath at this station. The skip is raised and contents dumped into the cupola while the circular weigh buckets index for the next charge. Two men on this platform handle the entire melting make-up with a minimum of manual effort.

Cupola blast is maintained by two 8100-cfm, 1½-lb pressure blowers arranged so that either cupola may run from either blower or both may be operated simultaneously from both blowers. Both blowers are equipped with air weight control. Melting is controlled so that iron comes to the spout at between 2780 and 2830 F and with an analysis of C 2.50 to 2.60 per cent, Si 1.35 to 1.45 per cent manganese as required, P 0.04 to 0.05 per cent, and S 0.12 to 0.14 per cent.

Raise Temperature in Furnace

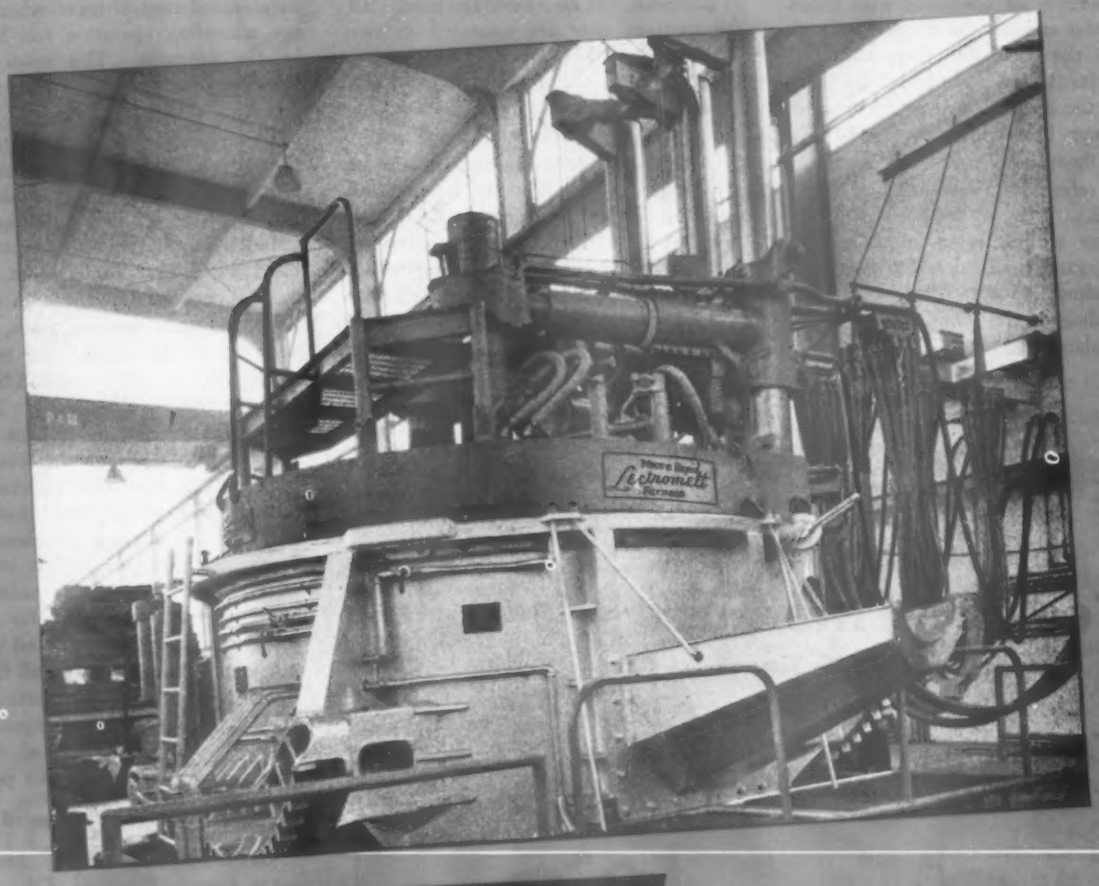
The two holding furnaces, 8 ft 9 in. wide and 36 ft long, fired by pulverized coal from the central system, and having air-cooled bottoms, are served by a common stack. Reduction results in an iron inside the following ranges:

C	2.35—2.45 per cent
Si	1.35—1.45 per cent
Mn	As required
P	0.04—0.05 per cent
S	0.12—0.14 per cent

Spout temperature is held at 2890 to 2900 F. The metal from these furnaces is tapped almost continuously into 3000-lb insulated bull ladles and distributed by overhead electrified monorails referred to previously and shown in Fig. 3.

Molds in each mechanical unit are filled with metal while in transit past each pouring station. After sufficient cooling, the molds are shaken out over vibrating shakeouts in the floor. A hood and exhaust system at each shakeout station remove smoke and dust. Sand falls on a belt which carries it back to the reconditioning station. Empty flasks are returned to the molding stations and the castings are carried by overhead bucket conveyor to a dumping station where they are moved on an apron conveyor

(*Continued on page* 218)



How MOORE RAPID Lectromelt TOP-CHARGE INCREASES PRODUCTION

The top charge feature of Lectromelt allows the placing of full charges quickly. Only a few minutes are required between heats, if the charge bucket is filled while the previous heat is melting. Top charging permits the use of either large bulky scrap or light fluffy scrap. Top charging results in reduced power, electrode, and refractory consumption. The simplified construction of Lectromelt Furnaces has made top charging practical, efficient and economical. Lectromelt Furnaces of the top charge type are available in capacities ranging from 100 tons to 250 pounds. Write for complete details.

PITTSBURGH LECTROMELT FURNACE CORPORATION
PITTSBURGH 30, PENNA.

(*Continued from page* 216)

past a number of operators who knock off the gates and toss the castings through chutes at the back, delivering to a collector belt. Gates, sprues and scrap remain on the apron conveyor for transfer to a lower belt which eventually discharges them onto the south revolving platfrom referred to previously and shown in Fig. 2.

Castings are inspected, classified, annealed, ground, tumbled, and straightened in a building 245 x 480 ft adjoining the first building on the south. A battery of four standard-type batch annealing ovens in the extreme southwest corner are still in existence, but no longer are used. All the castings now are annealed in two continuous type furnaces operating on a 39 hr cycle and in five of the latest type base and cover type furnaces operating on a 55-hr cycle, and shown in Fig. 9. An extra base facilitates the use of a hot furnace and allows for cooling and make-up of the next charge. All furnaces are controlled by time rate controllers set up to eliminate the human element as far as possible. The furnaces are fired with natural gas, with a standby system of propane liquid gas stored in tanks in the yard. All furnace controls are located in an elevated control room where the entire annealing operation can be viewed by the operator. This room is under pressure by a fan drawing in clean outside air.

Each furnace base rests on a heavy foundation with an access tunnel to permit servicing the three circulating fans in each base. The base proper is surrounded by a shallow channel or moat filled with loose sand which serves as a seal while the oven is in operation. Equipped with burners, tubes, insulation and refractory lining, the oven body weighs 28 tons and is handled by a gantry type electric traveling crane. Two hooks on two cables suspended from the crane engage the frame of the oven at two points in the steel binding and maintain the oven in a true and level position when going on or leaving the hearth. The furnace handling crane has an auxiliary hoist for charging and unloading the bases. It also has means for propelling the charge cars from one end of the layout to the other, bringing all these functions under one man. A vertical, pointed steel post, a giant enlargement of a flask pin, at one corner of the hearth guides the oven into proper position.

Scaling Is Prevented

Gas is burned in a series of metal tubes set in a vertical, instead of the usual horizontal, position. Dazzling, radiated heat from the tubes supplies the necessary heat for the annealing process. Scaling of the surface is prevented since the flame does not come in contact with the surface of the castings. One of the advantages claimed for this type of furnace is that it does not require packing. Gas enters the oven through a single hose connection at one corner, easily connected or disconnected.

This process reduces the annealing time to an appreciable extent. In the usual malleable iron annealing process the complete cycle includes five stages: Heating to maximum temperature 1600 F, 30 hr; holding at 1600 F, 45 hr; cooling to Ar_1 and holding there 35 hr; cooling to handling heat 5 hr. This is a total of 115 hr, or a six-day cycle at least. Additional time must be allowed for charging and pulling. The usual commercial time is seven days. Cycle of nine days is not uncommon with large furnaces.

With the new continuous furnaces the total annealing time has been reduced to 39 hr for the continuous furnaces and 55 hr for the base and cover furnaces. At present further time cycle reductions appear plausible. In the 39-hr cycle, 30 per cent of the time is consumed in raising the temperature to 1750 F; 25 per

(*Concluded on page* 220)

Drillet Box Jig Saves Up to 75% of Jig Body Expense and Labor!

The six-sided Drillet Box Jig above and at right has a range of 125 different sizes, making it possible to accommodate all sizes up to 6" capacity—for drilling, reaming, counter boring, counter sinking, spot facing, tapping, etc.

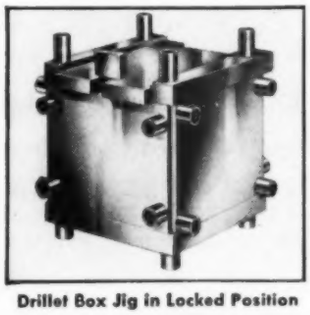
The Drillet Box Jig makes special tool design for drill jig unnecessary. Saves up to 75% of the time and cost of building a jig body. By merely turning thumbscrews and raising leaf, parts may be quickly loaded or unloaded. The jig may be used on all six sides, taking advantage of its full capacity.

Another useful product is chewing gum. You can enjoy chewing Wrigley's Spearmint Gum even while your hands are busy. The pleasant chewing helps to steady you—helps keep you alert and on your toes when you're doing a monotonous job.

Besides the satisfaction chewing gives you, it helps keep your mouth moist and fresh so you naturally feel better—and feeling better you work better.

Scores of industrial plants report that they have stepped up their workers' morale and efficiency by making chewing gum available to them.

You can get complete information from The Chicago Drillet Corporation, 920 S. Michigan Ave., Chicago 5, Ill.



Drillet Box Jig in Locked Position

AA-59

Control Radiography

PAYING DIVIDENDS as an accurate guide in die designing

Die making and design are not a guarantee that a die, upon initial operation, will produce castings free from faults.

Various performance tests enable the die maker to change gates or vents which may be required because of obvious structural voids or voids which become apparent only after expensive machining operations.

Recently, die designers have found *x-ray* an invaluable "control tool" . . . through radiographic studies of the internal structure of trial run castings. The necessity for changes in gating and venting is determined quickly, thus providing more rapid die development at greatly reduced cost.

When *x-ray* is used in the development and "spot-check" of die castings, the economy is far-reaching. X-ray eliminates the extra expenses involved in development time, and the wasteful production of a large number of trial castings.

Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-02058

Radiographic study of a motor bracket shows excessive porosity in the first production run. Both tapped holes and machined surfaces are called for at the points where these faults occur. X-ray examination prior to production would have detected this condition and subsequent loss been eliminated.

Radiograph of the same casting from a later run after a gate change had been made to produce a sound casting.

(*Concluded from page* 218)

cent holding at 1750 F; 12 per cent fast cool from 1750 to 1400 F; and 33 per cent cooling from 1400 to 1300 F. At this temperature the castings are removed from the furnace. No atmosphere is added in the furnace proper. However, vestibules are purged with DX gas just before making a push.

In the 55-hr cycle on the base and cover furnaces, 35 per cent of the time is devoted to raising the temperature to 1750 F; 25 per cent to holding at 1750 F; 12 per cent fast cool from 1750 to 1400 F; and 28 per cent slow cooling from 1400 to 1300. No special atmospheres is used on these furnaces.

Specially designed rollover dumpers transfer the annealed castings from furnace trays and baskets to tote boxes. Baskets from the continuous furnaces return empty to the charging end on an inclined track. Baskets from the hood furnaces return on the transfer car. An overhead crane and transfer track system serve the battery of cleaning machines where the castings in constant motion are exposed to hard-hitting streams of metal abrasive. Cleaned castings are discharged to a transfer skip which, aided by an electrical feeder, distributes the castings on a long classification, or sorting, belt. Operators select the castings into any one of a long series of bins located in front of and adjacent to the belt.

The finishing room deserves particular mention. Castings are conveyed through all operations in tote pans on roller conveyors so arranged that any pan may be taken through any shear, grinder or press at the will of the supervisor. Suitably arranged roller transfer cars make this unusual flexibility. All points in both blasting and grinding departments, where dust might be created, are covered by dry type dust arresting equipment, depositing all foreign matter in the air in tanks outside the building.

Loaded again into the containers the castings pass through the shear department and then on roller conveyors to a long line of grinding machines. With a loaded and an empty container within reach, each grinding operator lifts the castings from the loaded container, swiftly touches the necessary points to the grinding wheel, and then tosses the casting into the empty container. As each container is loaded it is carried by conveyor into an adjoining department equipped with seven hydraulic presses capable of exerting pressures varying from 300 to 750 tons. Castings that pass through the presses are true to shape and dimensions. In many instances the tolerances are specified in thousandths of an inch. Empty pans return to the storage bins by overhead conveyors.

After the press operations, final inspection, incidental finish and gaging complete the work on the castings before they are bagged or assembled in tote boxes for shipment. Since the majority of the product is shipped by truck a large covered shipping dock with a capacity of eight trailer bodies was built to serve the shipping department.

The engineering firm which handled details of the revamping program was Hopkins & Kendall, Alliance, O.

ELECTRIC MELTING of ALUMINUM ALLOYS

No Longer a Luxury

Aluminum alloy iron-core induction melting furnaces, the first of this kind capable of continuous operation, have been developed at Ajax's Experimental Foundry (see photo upper right). Simplified cleaning methods and improved design of melting channels have resulted in increased lining life and reduced maintenance cost.

Job of melting 300 pounds per hour requires 60 kw. unit (see photo above) occupying about 4' x 4' x 4' space, requiring no foundations and provided with a self-contained internally wired control cubicle, including potentiometer type temperature controller. Operating cost from 40 to 70 cents per hour, with maintenance items almost negligible.

Another unit of 20 kw. capacity is finding wide acceptance as holding furnace in die casting and permanent mold work. Space required is about 3' x 3' x 3', no foundations, self-contained control cubicle. Operating cost from 8 to 12 cents per hour. Metal charge of crucible is 300 pounds.

X-ray investigation carried out on metal processed in Ajax induction furnace proves that accurate (free of time lag) temperature control, typical of these furnaces, allows casting consistently at lowest and most adequate temperatures necessary for sound castings, all of which results in considerable reduction of rejects.

AJAX ENGINEERING CORPORATION
TRENTON 10, N. J.

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

Associate Companies: **AJAX METAL COMPANY**, Non Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

Form New Company To Make Crucibles

National Crucible Co., Mermaid Lane and Queen St., Philadelphia 18, has been incorporated to manufacture carbon bonded graphite crucibles, silicon carbide furnace covers, furnace linings, base blocks and refractory cements. Robert S. Ross is president of the new company, Kenneth E. Buck, vice president and treasurer, and Bernard T. Jacob, secretary. The three officers formerly were connected with the Ross Tacony Crucible Co.

CONVERTER PROCESS IN STEEL FOUNDRIES

(*Continued from page* 83)

In principle, the converter process is simplicity itself. A charge of molten iron is poured into a suitably shaped cylindrical vessel lined with refractory material, and set in a vertical position. No fuel or other source of heat is required the metal being raised to a high temperature simply by the heat of oxidation of some of its constituents, which are oxidized rapidly by a blast of air blown either through the metal or against its upper surface. When these heat-producing elements have been eliminated by oxidation, comparatively pure iron at a high temperature remains in the vessel. By suitable additions, the composition of this metal is brought to the desired proportions, and it is then discharged into a ladle and poured into the molds.

Metal Melted in Cupola

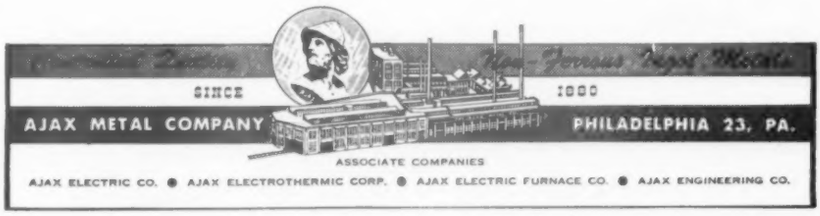
Large converters used to produce steel for heavy ingots blow pig iron brought in a molten state from the blast furnace, and held liquid in large, fuel-fired tilting furnaces called mixers. Foundry converters, however, are supplied with metal melted in cupolas and consisting of mixtures of steel scrap, pig iron and (usually) ferrosilicon, so chosen as to give the desired composition in the melted product. This metal contains several per cent carbon, manganese and silicon, which are the elements whose combustion in the converter gives the necessary heat to raise the temperature of the metal to the desired degree. The greater part of the heat is due to oxidation of the silicon the amount contributed by the manganese and carbon being much smaller. As the heat is liberated within, not over the metal—as it is in fuel-fired or electric furnaces—the temperature of the charge is raised very rapidly. When the heat-producing constituents are eliminated, the melting point of the resulting comparatively pure iron is much higher than that of the charge. However, so much heat has been generated that the temperature of the blown metal is several hundred degrees above this higher melting point.

As the greater part of the heat produced is due to combustion of the silicon, it would seem that, to secure metal of any desired temperature, all that would be required would be to have the initial silicon content high enough to yield the necessary number of calories. Indeed, at least one recent article on the production of converter steel for castings has given the impression that it is really as simple as that—for more heat, just have higher silicon in the charge. In fact, the article in question even gives the algebraic formulas for calculating the amount of silicon required. Unfortunately, as will be explained in more detail later, such is far from being the case.

Large converters used for the production of steel for ingots are mounted on trunnions, and are turned backward to a horizontal position for charging, and forward to pour into the steel ladles. The bottom portion of the vessel is built as a separate piece, so that when necessary it can be readily removed and a new one put in place. Its lower portion consists of a hollow chamber, called a wind-box, connected by large-diameter pipes that come out through one trunnion, with the line bringing air under pressure from the blowing engine.

From the wind-box, a number of refractory tuyeres, each containing many holes about 3/8-in. in diameter, extend to the upper surface of the bottom, which seals off the lower end of the vessel. Refractory material is rammed around the tuyeres and fits against the refractory lining of the body of the vessel. The

Designers and foundrymen, charged with the gigantic responsibility of specifying engineering materials for the products of a world once again at peace, are closely scrutinizing the widest range of selectable materials ever offered to industry. Of primary importance is the direct consideration of Performance; and, decisions thus made must, of necessity today, be tempered with new emphasis on total Cost. An alloy, therefore, which measures high in strength, toughness and corrosion resistance—which has cut its eye-teeth long ago on marine castings and fittings, engine bases, pump bodies, gears, etc.—yet permits the foundryman to produce solid castings perfectly free from surface imperfections and which leave the sand bright and clean—and will take a mirror-like polish —an alloy like that deserves investigation. A metal of such calibre is Ajax High Tensile Manganese Bronze. Produced under rigid laboratory standards to constant formulae, this Ajax ingot has established recognition as the highest quality manganese bronze available. Write for complete data NOW.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tuyeres serve to carry the air into the metal in the converter. The body of the vessel is roughly cylindrical, tapered at one end to fit the bottom, and at the other to form a contracted, open "nose." When the converter is in a horizontal position the enlarged middle portion carries the charge, which then lies clear of the tuyeres and about level with the open nose.

In operation, the converter is turned backward to the horizontal position, the required amount of metal is run in through a spout, the blast is turned on, and the vessel quickly brought to the vertical position. The air is at so high a pressure that it not only keeps the metal from running out through the tuyeres, but is forced through the bath in great volume. At the end of the blow, the vessel is turned forward so that the tuyeres again clear the charge, the blast is turned off, and the blown metal is poured into a ladle carried by the crane. The blast pressure is about 25 to 30 psi, and the volume of air is so large that blowing engines of the reciprocating type or turbo-blowers are needed to furnish it. The cost of producing the steam required by these blowing engines is quite a large item in the operating expense of converter plants.

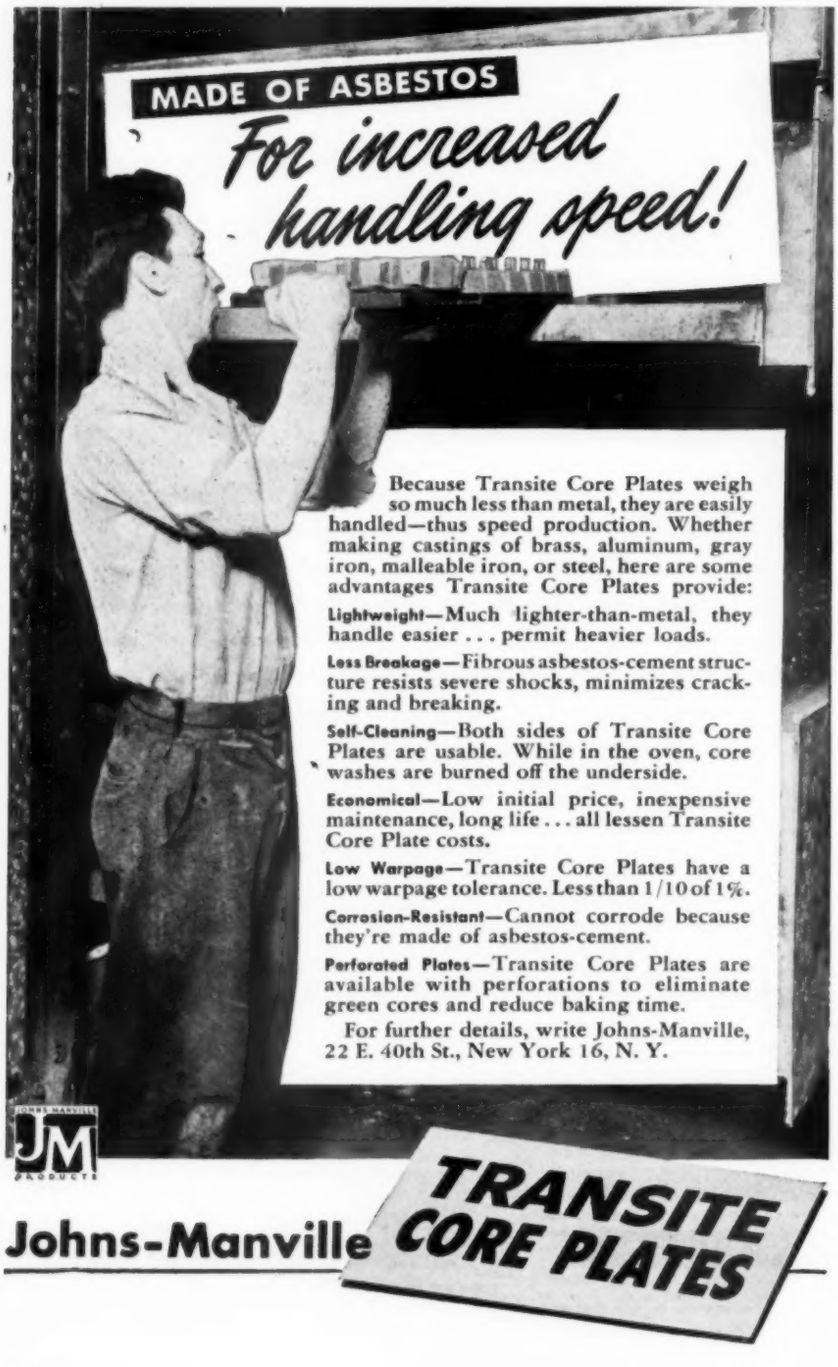
Most of the small converters used in the early days of the industry were of this type, and as can readily be inferred from reading contemporary descriptions of the process, left much to be desired. In the 1904 edition of Harbord & Hall's *Metallurgy of Steel*, for instance, the authors say[1] "The great difficulty in dealing with very small charges in Bessemer converters is to obtain the metal sufficiently hot so that it can be readily dealt with in large or small quantities without skulling the ladle." As already mentioned, simply to increase the silicon content of the initial charge did not produce steel that was sufficiently hot, and at the same time free of the tendency to evolve gas in solidifying in the molds, which of course resulted in pin holes in the castings. English and French metallurgists working with converters were engaged in a continuous effort to secure gas-free, hot steel, and a brief review of the early history of the process will give a better understanding of the principles involved in operating modern small converters.

Introduce Side Blow Converter

Though a higher initial silicon content in the charge did not give the desired results, it was soon found that by adding silicon as ferrosilicon thrown into the converter during the progress of the blow, hotter steel was secured. This method was used for many years, was mentioned in several patents[2] and, as will be described later, was also used in the side-blown converters first successfully developed by A. Tropenas in England and introduced in this country in the early part of the present century.

To understand the reason for adding ferrosilicon during the progress of the blow, instead of increasing the initial silicon content of the vessel charge, to give hotter steel, it is necessary to understand what happens in the operation of a small bottom-blown converter of the conventional type. The charge of such a vessel commonly contained some 1.80 per cent to 2.20 per cent Si, about 0.60 to 0.80 per cent Mn, and roughly 3.50 per cent C. The latter is absorbed from the coke used in melting the charge in the cupola, and seldom varies much from this figure.

When air is blown through this metal the silicon is first oxidized to SiO_2 by the reaction $Si + 2O = SiO_2$. Actually it is probable that at the mouths of the tuyeres, considerable manganese and iron also are oxidized by the reactions $Mn + O = MnO$, and $Fe + O = FeO$, but are reduced again by the silicon higher up in the charge, which has the highest affinity for oxygen of the four elements, at the temperatures prevailing at the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start of the blow. These reactions are, of course, $2FeO + Si = SiO2 + 2Fe$, and $2MnO + Si = SiO_2 + 2Mn$. Thus the net result is the elimination of silicon.

Very little, if any, carbon is oxidized at this stage of the blow, so that there is no generation of carbon monoxide to produce a boiling action. The metal, therefore, is agitated only by the nitrogen being forced through it, and as a result the resistance to the passage of the blast is at a maximum and the amount of air passing through the bath per minute is a minimum. The blowing engine labors heavily, because of the resistance of the non-boiling bath to the passage of the blast. Only sparks and a faint reddish flame come out of the vessel.

Describes Various Stages of Blow

The combustion of silicon only, or, at any rate, of silicon and a part of the manganese, continues until the silicon has been reduced to some 0.30 to 0.50 per cent. This flame-less period of the blow will be longer or shorter, depending upon the initial silicon content of the charge. It may in extreme cases, where the initial silicon is some 2.50 per cent, last as long as 9 or 10 minutes. It is followed by the carbon-burning stage, when a brightly luminous flame pours from the mouth of the vessel. This flame is due to the combustion of the carbon, which burns chiefly to carbon monoxide by the reaction $C + O = CO$, under the surface of the metal and inside the converter, producing but little heat at the point where the heat is wanted. This CO ignites at the vessel's mouth, and burns to CO_2 by the reaction $CO + O = CO_2$, with the evolution of much more heat than is produced by the burning of the carbon to CO. This heat, however, is quite wasted, as it is evolved outside the vessel. The great length of the flame and its brilliance is proof positive that the combustion of CO to CO_2 is taking place outside the vesel, for if any large and effective amount of CO were burned to CO_2 inside the converter, the flame obviously would be short. Complete combustion of CO to CO_2 inside the vessel of course would give almost no flame at all, in the manner of modern gas burners in which rapid and complete combustion of the gas is effected.

During the carbon flame period of the blow, the last of the silicon and most of the manganese are oxidized, until the content of these metalloids is reduced to about 0.06 to 0.08 per cent. The length of the carbon-burning period is fixed by the percentage of carbon in the charge which, as already mentioned, does not vary much from 3.50 per cent. It requires, then, about 6 minutes from the time the carbon flame appears to reduce the carbon content to 0.08 per cent. When the carbon reaches this figure, the flame shortens or "drops" quite rapidly, when the vessel is turned down and the blast shut off.

Oxidation of the carbon contributes but little to the temperature of the steel, owing to the small evolution of heat produced by the burning of carbon to CO. The final temperature of the steel, therefore, depends chiefly upon the amount of heat absorbed from the oxidation of the silicon in the initial stages of the blow. During the carbon-flame period, the rapid evolution of CO in the metal results in a violent boil, so that the passage of the blast through the metal is greatly assisted by the up-rush of CO. As a result, the engine speeds up and more air passes through the tuyeres per minute than in the silicon-burning period. As mentioned previously, it was soon found that the combustion of a given amount of silicon, added as ferrosilicon during the carbon-flame period, increases the temperature of the steel much more than is the case if the silicon of the initial charge is increased by an amount equal to that of the silicon in the added ferrosilicon.

At first sight, this sounds like an impossibility, since a given amount of sili-

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con oxidized produces the same total quantity of heat, regardless of the state of the blow at which it is burned. The oxidation of this given amount of silicon, too, requires a definite amount of oxygen and therefore a definite amount of nitrogen forced through the metal.

However, not all of the heat produced by the combustion of the silicon is retained by the metal. A part is lost by radiation through the walls of the vessel; this loss is at approximately a constant rate, and therefore varies directly with the length of the blow. Another, and probably larger part, is lost in raising the temperature of the inert nitrogen of the blast. If the silicon is burned slowly, as it is in the initial, flame-less period of the blow, the proportion of the heat evolved by its combustion that is lost by radiation is obviously higher than if the combustion of the silicon were rapid. Whether the oxidation of silicon be slow or rapid, the total quantity of air, and hence, of nitrogen passed through the charge during a blow is the same, and it is only reasonable to assume that the rate at which this nitrogen passes through the metal must affect the amount of heat it absorbs.

During the flame-less silicon burning period, when the bath is not agitated by the evolution of CO, the nitrogen passes through the metal more slowly than during the carbon-flame period, when the bath is violently agitated. It is probable that in this latter period, the nitrogen is brought into less intimate contact with the charge and for a shorter time per unit volume of nitrogen passing, than in the silicon-burning part of the blow. Less heat, then, is absorbed from the metal and carried away by a given amount of nitrogen when the silicon is burned rapidly during the carbon-flame period. In any event, whether or not this be the correct interpretation of the mechanism of the process, it is an undoubted fact that much hotter steel is produced when the silicon is not introduced in the initial charge, but thrown in during the carbon-flame period.

(To Be Continued)

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1. Page 72.
2. U. S. Patent No. 743,715, Nov. 10, 1903, R. A. Hadfield. U. S. Patent No. 354,694, Feb. 25, 1908, A. Tropenas.

101

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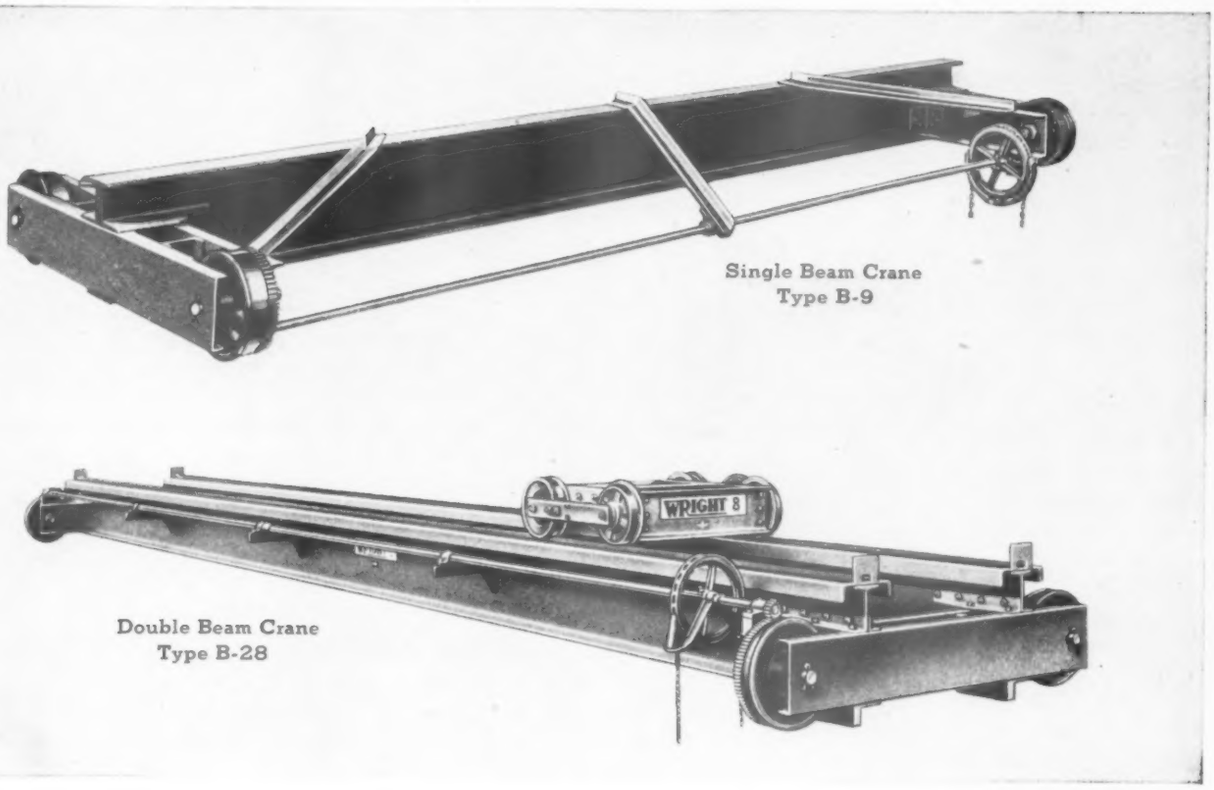
Gives Pointers on Job Incentives

How a sound wage incentive plan can reduce labor costs and increase plant efficiency is detailed in a special analysis booklet, *Practical Pointers on Incentive Plans*, published by Labor Relations Institute, 1776 Broadway, New York 19, for $2.50. The report presents a guide to the advantages of the best known types of incentive plans and lists the dangers which may be encountered with each. Eleven factors have been set up for measuring the efficiency of any incentive structure. The report provides the technique and methods for gaining employee or labor union acceptance. If an incentive plan is to receive the co-operation of the work force, 17 questions must be answered to the employee's satisfaction. The analysis on which the report is based was drawn from actual experience with over 400 incentive installations. It is claimed that over a period of time, a well planned incentive program should increase production between 20 and 38 per cent, reduce labor cost 11 per cent and increase take home pay of the employees 15 to 20 per cent.

Giebel Inc., New York and New Haven, Conn., has been appointed by the Hill Acme Co., Cleveland, as exclusive representatives to handle the sale of open side hydraulic surface grinders, in the northern half of New Jersey, the eastern section of New York and the entire state of Connecticut.

WRIGHT CRANES



Single Beam Crane
Type B-9

Double Beam Crane
Type B-28

Competition is going to be plenty tough all this year and next. Never before in all history have manufacturers stood in such need for labor-saving — labor-aiding equipment, and production efficiency. Not only do you need a Wright traveling crane which will really put your ceiling to work, but you need Wright's material-handling experience to help you cut costs and assist you in speeding up production.

Wright material-handling equipment (cranes, hoists, and trolleys) is built in a wide range of capacities and to meet the most exacting specifications. The Wright combination of crane and hoist is engineered not only to help bring your production costs down to competitive levels but for reduced maintenance expense. Call your local Wright distributor (see metropolitan classified telephone directory). If your problem is special he will bring along a Wright engineer. In the meantime, write for Wright Specification Bulletin, or Catalog 12-D.

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WRIGHT MANUFACTURING DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

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MAKING CORED ALUMINUM CASTINGS

(*Continued from page* 96)

and discharges sand into hoppers over five coreblowing machines.

Considering a typical operation cover cores for manifold, shown in Fig. 2, which are about 40 in. long with a gross weight of 24¼ lb and a finished weight of 16½ lb, are made by two operators on a coreblowing machine. The corebox is 4½ in. deep, 11¼ in. wide, and 42¼ in. long. The box contains two long loose pieces, which are set in place followed by stiffening or support rods. The rods, ten in number, are set on stud or stool supports; four are laid the long dimension and six across the short dimension. The core is blown, slid from the machine to a roller conveyor and a flat plate placed on top of the box. Box and plate then are pushed into a rollover-drawing device similar to that shown in Fig. 6, and the corebox drawn from the core.

The core is pushed from the machine, which is then reversed. One operator takes the corebox back to the blower to prepare it for blowing another core, while the other operator removes the loose pieces, touches the core up where required, and pushes it to a wide roller conveyor at right angles to those of the coreblowing line. The long conveyor carries the cores to the continuous baking oven. Production is 175 cores in 8 hours.

Core Stiffened with Wires

Interior or pipe core for the manifold is made by blowing in a box 5 in. wide, 5¼ in. deep and 34 in. long. The box is quite intricate and contains six loose pieces. Eight rods or wires bent to shape are set on stools for stiffening the core. As in the case of the cover core two operators perform the work and turn out 175 cores in 8 hr. Baking oven is a two-chamber horizontal type elevated above the floor to gain headroom. One chamber of the oven is used for baking and the other for cooling.

From the oven the manifold cover cores are placed on a conveyor leading to the assembly line, and the pipe cores are placed on racks. Cover cores are checked for distortion, inspected and cleaned, sprayed with plumbago mix, dried by torch, and then are ready for assembly. Pipe cores are taken from the racks, cleaned and inspected, and dipped in blacking. After dipping they are placed on racks and sent through a continuous, box type baking oven shown in Fig. 4. Dried cores are jigged and gaged to see that they are within limitations, and then assembled into the cover cores. Following assembly they are inspected, racked and the paste dried in the box-type oven. From the oven they are placed on racks which are taken to the molding line by electric truck.

Molds for the manifolds are made on a continuous unit, oval in form, containing 42 cars 5 ft long and 30 in. wide. Flasks are 16 x 48 in. Cope flask is 6 in. deep and the drag flask 12 in. Molding is performed with a sandslinger centrally located within a turntable on which two drag and two cope patterns are mounted. Operators include one on the sandslinger, one strike-off man, two men handling flasks, one core setter and one helper. Core assembly for the manifolds weighs about 84 lb, and fixtures are used so that the core is located properly, as shown in Fig. 1. Production on the unit is about 35 molds per hour.

Molds Poured Near Furnaces

Mold conveyor passes in front of the melting furnaces where the molds are poured. After passing around the curve the molds are shaken out on a vibrating grid at that point. Flasks are swung to the molding unit by a jib crane. Castings are stamped with a heat number, and carried by truck a short distance away where the cores are shaken out on a vibrating grid. Wood locating strips are affixed to the grid to hold the castings so that the surfaces will not be marred. Core sand removed from the castings passes through a crusher to break up lumps so that chills and core wires can be recovered, and is elevated to an outside storage hopper from which it is taken by truck to the dump.

Sand from the mold shakeout is elevated to an overhead belt which conveys it to sand handling equipment at the opposite end of the molding unit. There the sand is screened, mulled and reconditioned, and elevated to a storage hopper. From the storage hopper the sand is conveyed by an overhead belt to the sandslinger unit.

Following cleaning the gates and risers on the manifolds are removed on a band saw, and then the stubs at those points are removed by rough grinding on pedestal type grinding machines. Castings are placed on racks which hold 75 pieces, and two such racks are loaded into one of two rectangular batch-type heat treating furnaces where they are aged for 5 hr at 550 F. Ovens are gas-fired. Heat treating department also contains an electrically heated circular furnace 48 in. diameter and 7 ft deep which is used for heating smaller castings, a quench tank, and an impregnator in which certain castings are treated with sodium silicate at 220 F.

Aged castings are given a rough inspection, chipped and filed with rotary pneumatic tools and again inspected. Then they are abrasive blasted in a rotary table machine, inspected and subjected to finish filing or burring operations. The castings are given a water pressure test, checked on target fixtures where some of the finishing lines are laid out, and then forwarded to another section of the department for customer inspection. Tolerances of the castings are held to ±0.030-in. wall thickness, 1/32-in. warp, and 3/16-in. clean-up on machined surfaces.

Werra Aluminum Division also made several sizes of blowers or superchargers for diesel engines, one of the larger of these being about 47 in. high, 42 in. wide and 28 in. deep. Main opening for the impellers is shaped like the figure 8 to accommodate the two 3-lobe impellers. In the as-cast state the blower weighs 1650 lb and when finished about 750 lb. Jacket core for the blower weighs 1100 lb, and is made on the floor in two pieces. Corebox is 2½ ft deep, 5 ft wide and 6 ft long, and contains seven loose pieces varying in size from 2 x 2 x 6 in. to 12 x 21 x 47 in. These are replaced by dryer sections weighing 300 lb before the core is baked. It takes two men about 2 hr. to make the core.

Chills Incorporated in Cores

Barrel core, or that forming the impeller opening, weighs 1800 lb, and likewise is made in two pieces on the floor. Jacket core after baking is placed in a cradle and clamped to a coreplate. The whole is then rolled over with a crane for cleaning and finishing. Numerous chills are employed on the cores to insure dense sections through directional solidification. For example, the barrel core is faced with 64 sectional corrugated chills, and the two outside cores contain 28 each. Molds for the blowers are rammed up by a locomotive type sandslinger in two flasks 60 x 80 x 30 in., and poured from the two bull ladles.

Metal for castings is melted in 14 furnaces. One line opposite the continuous molding unit on which the previously-described manifolds are made contains nine 1000-lb capacity, oil-fired, iron pot furnaces. Another line of five 400-lb iron pot furnaces is located in an adjoining room. All furnaces are pyrometrically controlled, and temperatures are taken before pouring to see that they are within the desired limits. Procedure in melting is to leave a molten heel of about 100 lb in the pot, or on starting up to

first melt just enough ingot to form such a heel, and add 900 lb of ingot. In 60 to 70 minutes the temperature reaches 1100 F and the burner flame is cut back. The temperature then gradually rises to 1225 to 1275 F when it is treated by bubbling with nitrogen gas for at least 30 minutes. Temperature is increased to 1300 to 1375 F, and the metal treated with a proprietary dry flux. Reaction products are skimmed off, the metal is given another treatment of dry flux and skimmed. Just before pouring the metal into the ladles it is skimmed again. Flux is added to the metal in the ladle, and after skimming, the temperature is taken. At the end of the shift all metal remaining is taken from the melting pots and pigged. Sides and bottoms of the pots are scraped carefully to remove any dross and oxide accumulations, and then coated with a mica wash containing a small amount of sodium silicate.

Gray Iron Research Group Meets

Operators' Division of the Gray Iron Research Institute Inc. held its quarterly meeting at the Statler Hotel, Cleveland, Jan. 10-11. This meeting, attended by superintendents, foremen, metallurgists, and melters from 23 gray iron foundries in Midwestern and Eastern states, was devoted almost exclusively to the discussion of cupola practice. Approximately 45 men made a detailed study of their comparative practices, equipment and cupola facilities.

The meeting of the Operators' group was presided over by Chairman Jack Alberts, Plainville Casting Company, Plainville, Conn. Chairman Alberts directed the discussion of cupola operation with the aid of Tom Barlow and Dan Krause of Battelle Memorial Institute, utilizing the written information on cupola practice which has been accumulated by the Gray Iron Research Institute during the five years of its operation. This basic information was studied and correlated by the group to obtain a clear picture of every phase of equipment, cupola operation, control instruments, records, pyrometry, etc.

Many of the practices were standardized within the group through this discussion, and there seemed to be an excellent indication that even greater standardization of recommended practices would be followed. This type of standardization not only improves the individual practice but also permits of a greater exchange of information of a pertinent nature between the operators during their two-day round-table discussions held four times a year.

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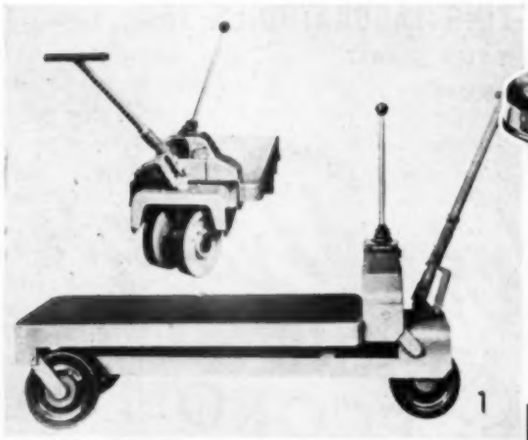
NEW EQUIPMENT and SUPPLIES

(1)—Lift Truck: Market Forge Co., Everett, Mass., has developed a new standardized lift truck available in two capacities, 3000 lb and 5000 lb. It employs the hydraulic principle in lifting, sealed ball bearings in the wheels, and offers a choice of all-steel, plastic or rubber wheels. Each stroke of the lifting mechanism is a power stroke, and the platform remains stationary at any height. Lowering is accomplished through a small accessible lever. The pulling handle is divorced from the lifting mechanism, to avoid possibility of accidents. The hydraulic mechanism incorporates an overload safety valve, which comes into play on a 20 per cent overload.

(2)—Shellac Pot: Freeman Supply Co., 1152 East Broadway, Toledo 5, O., is offering a new glass shellac pot which is said to be superior to old types of pots under practical shop conditions. Constructed of annealed glass, it is tough and durable and will stand rough usage. A replaceable wood wiping bar, ¼ in. diam, is furnished. The pot has a large, well spaced handle. Capacity is approximately 1½ qt. Overall height, including pot and cap, is 11 in.

(3)—Disk Grinder: Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11, announces a versatile 24-in. disk grinder, adaptable to all types of grinding on metal, wood or plastics. Both faces of grinding disk can be used and it will accommodate both flexible back cloth and paper back abrasives. Circular and core print fixture has a capacity of 22 in. diam and is wedge-shaped with 10° angle. The machine includes a heavily ribbed, normalized and machined table which tilts 45° down and 25° up by worm and gear drive. Grinder is available with its own dust collection system, or with a 4-in. exhaust tube to be attached to plant dust collecting system.

(4)—Normalizing Furnace: W. S. Rockwell Co., 200 Eliot St., Fairfield, Conn., has developed a new pusher-tray furnace for heat treating large steel castings almost automatically. It was designed to heat the castings to 1650 F, hold them at that temperature for one hour and then discharge them on an individual tray to cool in still air. Every 12 minutes one tray with its load enters the heating zone and one casting is discharged, the total normalizing time being 48 minutes in the heating zone and 60 minutes in the holding zone. The furnace heating chamber is approximately 15 ft x 6 ft 5 in. Gas burners are arranged for uniform heat distribu-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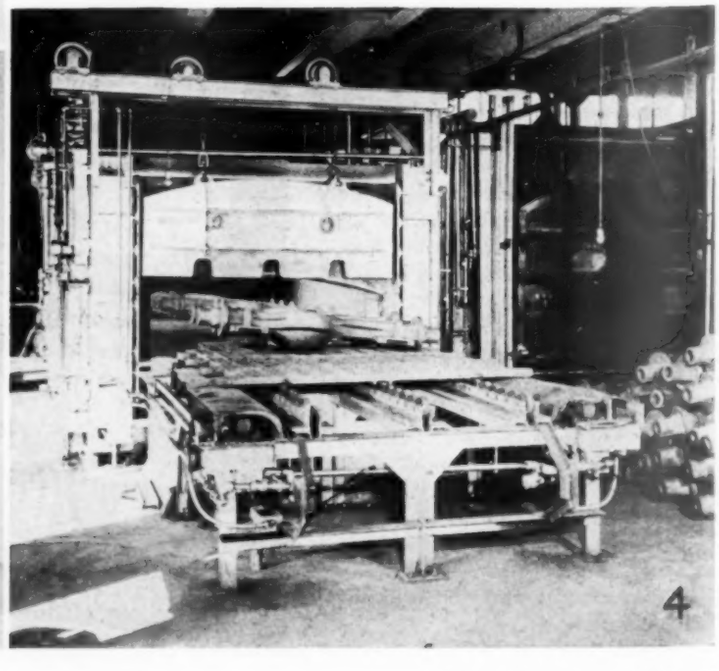
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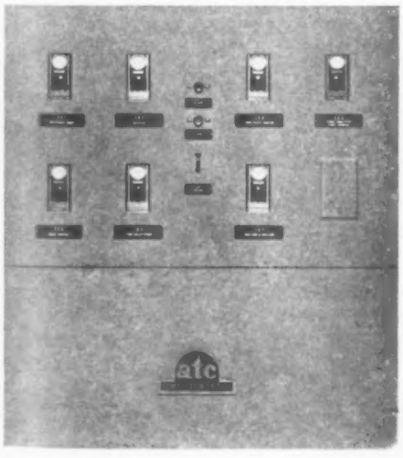
tion, and heat input for each zone is automatically controlled. A time clock is co-ordinated with the actuating mechanism to raise furnace doors, discharge heated work, push in new charge and lower doors in accordance with a predetermined operating program.

Dust Goggle: American Optical Co., Southbridge, Mass., announces an improved dust goggle which provides greater safety and comfort for industrial

workers. The goggle is equipped with an acetate eyecup that permits a wider angle of vision, and in addition, a thin wire mesh screen on the inside of each side shield gives maximum protection against fine dust particles. Eyecups, individually shaped to conform to the contour of the right and left eye, fit snugly against the face to keep out dust and powder. Ventilating system extends over a larger area to reduce possibility of fogging. Equipped with clear lenses, the retaining rings are of solid fibre.

Sand Curing: Automatic Temperature Control Co. Inc., 34 East Logan St., Philadelphia 44, Pa., has perfected an automatic time control panel for foundry sand curing. Completely automatic in operation, the unit electrically controls sequence and duration of all



interrelated functions on a time basis. By setting desired time periods, on seven dials of the unit, used sand is automatically sprayed, charged into a mulling hopper where bonding agent is added prior to mixing and subsequent discharge for cooling and re-use. Provision is made for operating the process intermittently as well as on a continuous schedule.

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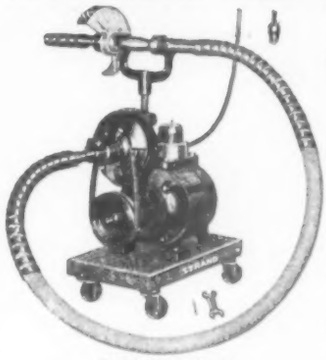

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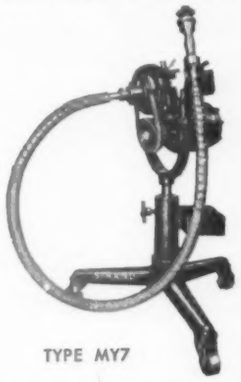

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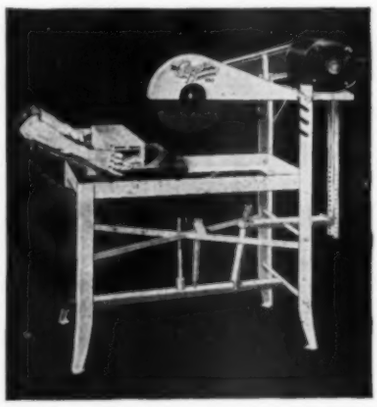
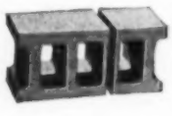


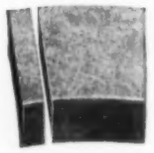
The new Clipper Multiple Cutting Principle makes possible faster cutting of every masonry material regardless of hardness.

Here are a few typical examples of the speed and accuracy with which concrete products and fire brick can be cut.



This concrete block, converted into a special size, was cut completely in two in 19 seconds.

One of the many intricate cuts performed on first quality clay brick for heat treating furnaces —made in 8 sec.



Rotary Kiln Blocks, cut to size for "key" bricks in rotary kilns, require only 10 sec. for completion of cut.

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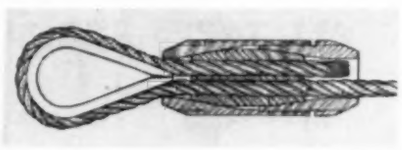
Wire Rope Clamp: Nunn Mfg. Co., 2125 Dewey Ave., Evanston, Ill., has developed a new wire clamp for securing wire rope, incorporating an exclusive wedging action which makes it possible to hold loads in excess of ten-



sile strength of the rope used. The clamp, of alloy steel, cadmium plated for weather protection, may be disassembled for tightening of stretched lines or other uses, and is available in all standard sizes from 1/16 to ¾ in.

Permanent Magnet: Eriez Mfg. Co., Erie, Pa., is offering a non-electric magnetic separator which is said to provide a simple and efficient means of removing iron and steel trash and ferrous materials from nonferrous metals and alloys. It also can be submerged in a circulatory oil system to collect ferrous particles. Working surface of the magnet is stainless steel. Power is furnished by Alnico steel maget castings and is said to last indefinitely. Various sizes are available.

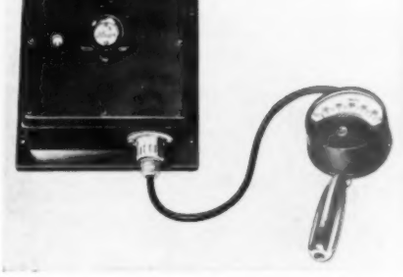
Enclosed Motors: Crocker-Wheeler Division, Joshua Hendy Iron Works, Ampere, N. J., is offering a complete line of alternating current squirrel cage, protected type motors from 1 to 200 hp. Sizes in standardized frames 203 to 326 have no openings in the frame or shields above the horizontal center line. Larger sizes have two shielded air exhaust openings in the upper half of the frame. A patented centrifugal bearing seal permits the use of softer grease. Bars, fans and end rings are cast in one operation in sizes 203 to 404. Larger motors have copper bars with brazed-on fans and end rings.

Vapor Cleaning: Oakite Products Inc., 57 Thames St., New York 6, N. Y., has developed a new multiple duty, steam cleaning unit. It comprises a self-contained, down-draft flame, oil-fired, enclosed coil type steam generator that delivers hot vaporized cleaning solutions under selective pressures up to 200 lb. A wide range of fuel oils, Nos. 1, 2 and 3 fuel oil, kerosene, or gasoline, may be used to operate the unit. Built for long, continuous service the unit has large reserve power and operates without vibration. Exclusive features include simplicity, rapid steam generation, large tank, simultaneous operation of two guns, wide flexibility, safety against fire.

Control Switch: Burling Instrument Co., 253 Springfield Ave., Newark, N. J., announces a temperature limit switch available as a one, two or three-switch model, with only one light-weight moving part. Important features include: Accurate, rugged, dependable, corrosion and heat resisting tube, dial pointer for easy setting, locking screw, increased adjustable ranges up to 700-1000 F, or in some cases up to 1200 F. Each switch has a separate adjusting screw so that the differential between the two switches on the E-2 and the three switches on the E-3 can be set at any desired point. Maximum differential between switches is approximately 150°.

X-ray Scanner: North American Philips Co. Inc., 100 East 42nd St., New York 17, announces a scanner for use with x-ray units which precisely records the geometric relationship of integrated components and spacings of segmented specimens. The new unit overcomes distortion and displacement that is present in all conventional methods of x-ray image recording. The unit measures 32 x 14 x 16 in., and consists of a motor-driven table on which the specimen and film move beneath an adjustable slit through which the x-rays pass. Table speed is 1/2 to 1½-in. per minute and can be adjusted to suit each particular application.

Pyrometer: Illinois Testing Laboratories Inc., 420 North LaSalle St., Chicago 10, announces a new portable hand pyrometer, available in a



choice of several scale ranges, equipped with bayonet type attachment plug at the end of the handle. The operator plugs the pyrometer into the receptacle box, which is connected permanently to the thermocouple. Excessive vibration, dust, dirt, fumes and similar conditions, which affect permanently installed pyrometers, are avoided with this portable unit, except at relatively short intervals as periodic temperature readings are taken.

Dot-Welding: Metallizing Co. of America, 1330 West Congress St., Chicago 7, Ill., has developed a new 220-volt, 60-cycle, single-phase quench-

arc weld machine, operating on alternating current, and a dot-weld pistol, which is offered as the closest practical approach to a true cold weld. The weld machine is furnished complete with streamlined cabinet, enclosed hinged top storage compartment, two 15-ft. lengths of cable, male and female receptacle, goggles, heavy duty ground clamp, 20 ft. of air hose with fittings and wall receptacle. Models are available in other voltages and cycles to suit requirements. The unit affords depths of penetration from .001 up to 1/32 in. Danger of high temperature is eliminated by a specially designed air pressure unit built into the pistol which quenches the electrode and arc in a constant stream of cooling air. In addition to its application in speedy repair of defective castings, the unit is ideal for press fit work, repair of cracked engine blocks and heads of internal combustion motors, and building up of aluminum, bronze, steel and gray iron patterns.

Reducing Valve: Leslie Co., 142 Delafield Ave., Lyndhurst, N. J., offers an improved type of internal pilot-operated air reducing valve, available in sizes ½ through 4 in. inclusive, designed for initial pressures up to 400 lb. air pressure and reduced pressures from 5 to 300 psi. Steady, accurate regulation and tight closing in dead-end service are provided. Plastic inserts in valve seats provide positive tight shut-off and long life. All wearing parts are renewable. Corrosion and wear resistance are obtained by use of stainless steel main valve, bronze controlling valve and corrosion resistant piston rings.

Lead Hammer: Nu Products Co., 1060 Broad St., Newark 2 N. J., has designed a new hammer of virgin tellurium lead with antimonial content which minimizes wear and eliminates danger from flying chips. Shaft is double steel rod, cadmium plated to avoid rust. Welded cross members on both ends absorb shock and impact. Handle is of durable plastic, serrated for sure grip, with safety bulge at end to prevent slipping. Specifications are: weight of head 5 lb., head size 4¾ x 2 in., handle length 7 in., overall length 16 in.

Greasing Unit: Pressurelube Inc., 609 West 134th St., New York 31, N. Y., has developed a portable type lubrication unit claimed to meet any lubricating requirement. Equipment can be supplied with a grease gun for every purpose either with battery-powered or gasoline-driven motor. No electric cord or air hose required. Unit delivers up to 12,000 lb, steady, consistent pressure to clear the most obstinate stoppages. All kinds of rolling stock may be serviced without removing load.

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surveys
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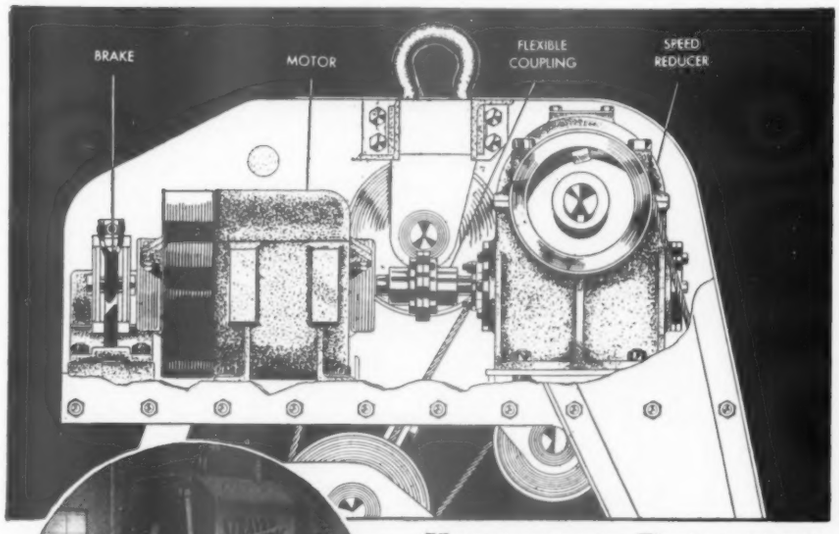

HOOK 'ER ON—PLUG 'ER IN

ABOVE YOU SEE WHY the Erie Electric Bucket works in its own headroom controlled from the crane cab. This sturdily constructed bucket needs only to be hooked over the crane hook and power line plugged in. The man in the cab controls the opening of the bucket from cracking the lips to any degree of opening or closing. The extra in-built weight permits easy penetration. *Write for complete particulars.*

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Air Conditioner: Curtis Refrigerating Machine Division of Curtis Mfg. Co., 1905 Kienlen Ave., St. Louis 20, Mo., announces a new, improved

model of its packaged air conditioning unit, which cools, dehumidifies, circulates and filters the air or which can be adapted for heating and humidifying as well. Installation requires only electrical and water connections. The unit is available in 3 and 5-ton capacities.

Fire Extinguisher: B. F. Goodrich Co., Akron, O., has developed a new carbon dioxide hand fire extinguisher, made to meet the full approval of fire underwriters. The container holds 4 lb. of carbon dioxide and is equipped with carrying handle and control button designed for fast operation. Horn swivel quickly raises or lowers as needed, remaining in lower position when attached to wall rack which is furnished with each extinguisher, together with quick release chain. The unit weighs 4 lb.

Air Diffuser: Anemostat Corp. of America, 10 East 39th St., New York 16, N. Y., announces that its air diffuser, used to eliminate drafts and equalize temperatures in air-conditioning, is again available for commercial purposes. The device distributes air of any duct velocity in a multiplicity of strata. Simultaneously the unit creates a series of counter currents which siphon into the device room air to about 35 per cent of the volume of supply air. This room air is mixed with the supply air within the diffuser before the air mixture is discharged into the room. Velocity of the discharged air is reduced instantly by air expansion within the device.

Arc Furnace Controls: Westinghouse Electric Corp., Pittsburgh, has developed two new types of arc furnace regulators. One is a rotating regulator of the Rototrol type. The other is an electronic control. Each does the same fundamental job, that is, maintain arc energy by causing the motor-driven electrodes to raise or lower as the activity of the melting charge dictates. They also adjust for electrode wear. The Rototrol principle originally developed to control the speed and accurate landing of elevators, also has been applied to control of position, speed voltage, current and other factors in dozens of applications. The electronic regulator uses dry type rectifiers to obtain a measure of arc current and voltage, has no moving parts and provides instantaneous response.

Spatter Resistants: Electric Welding Division, General Electric Co., Schenectady, N. Y., announces two new compounds specially designed for use in the welding field. Furnished in powdered form for mixture with water. No. 9951 readily can be removed with an air hose or dry cloth, while No. 9952 can be removed readily with a damp cloth or a direct stream of water. Work does not require wetting before they are applied. A special ingredient eliminates the necessity of adding a water soluble binder. The compounds cannot burn and are smokeless. It is claimed that one gallon will cover 450 to 750 sq ft, depending on the thickness of the compound covering.

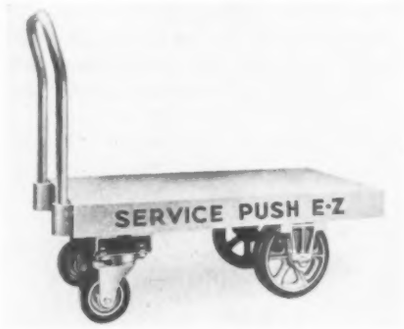
Welding Compound: A new arc welding compound to aid in instantaneously creating and maintaining a metallic welding arc where low currents and small diameter electrodes are employed is announced by the Electric Welding Division, General Electric Co., Schenectady, N. Y. The compound is applied easily on any kind of metal with any electrode. The compound in paste form is available in 1 lb glass jars. No mixing is required.

Flame Safeguard: Combustion Control Corp., 77 Broadway, Cambridge 42, Mass., has designed a photoelectric flame failure safeguard to provide explosion protection for oil and pulverized coal burners. When flame fails, the unit instantly cuts off fuel and

sounds an alarm. It consists of a phototube and amplifying system, housed in a dust-tight case and mounted on the furnace wall to permit the cell to observe the flame through a 2-in. pipe connection. A filter keeps the equipment dust-tight and therefore in condition to function accurately.

Control Valve: Ross Operating Valve Co., 6476 Epworth Blvd., Detroit 10, Mich., has developed a speed control valve to regulate the flow of air from the cylinder to the operating valve. Two moving parts include stem and poppet with the stem shaped to form a venturi for the passage of air in small volume. By turning the threaded stem down from a closed position incoming air in small volume passes through the venturi tube into the outlet passage. Continued turning of the stem causes a flange on the stem to open the poppet, permitting further increase in volume.

Truck: Service Caster & Truck Division of Domestic Industries Inc., Albion, Mich., is offering an all-magnesium alloy truck, built in co-operation with the foundry division of Hills-McCanna



Co., Chicago. Weighing 103 lb less than the same method made of steel, the truck has a capacity of 6000 lb, its lighter weight affording greater pay loads, easier operation and less physical fatigue.

Oil Gages: Oil-Rite Corp., South Thirteenth Street, Milwaukee 7, Wis., announces a line of recently developed oil gages. The gage body is brass and the unbreakable plastic sight is supported by a heavy central stem and a top cap. The assembly is locked with an independent nut. Gages can be taken apart for cleaning and can be installed where there is insufficient room for a one-piece gage. Standard sizes range from 1 1/4 to 5 in. Special sizes can be supplied. Also available are gages with drain plugs, or straight gages for applications where the elbow type is not suitable.

Brake: Stearns Magnetic Mfg. Co., Milwaukee 4, has designed a new magnetic disk brake for use on applications up to 100-hp motor-driven loads, in either floor or motor mounted types and for either ac or dc. Simplified design provides easy replacement of any part where necessary without disturbing brake assembly. All that is necessary for motor mounting is suitable end plate.

Centrifugal Casting News

Vol. 4 — CENTRI-MECO of KALAMAZOO — Mar. '46

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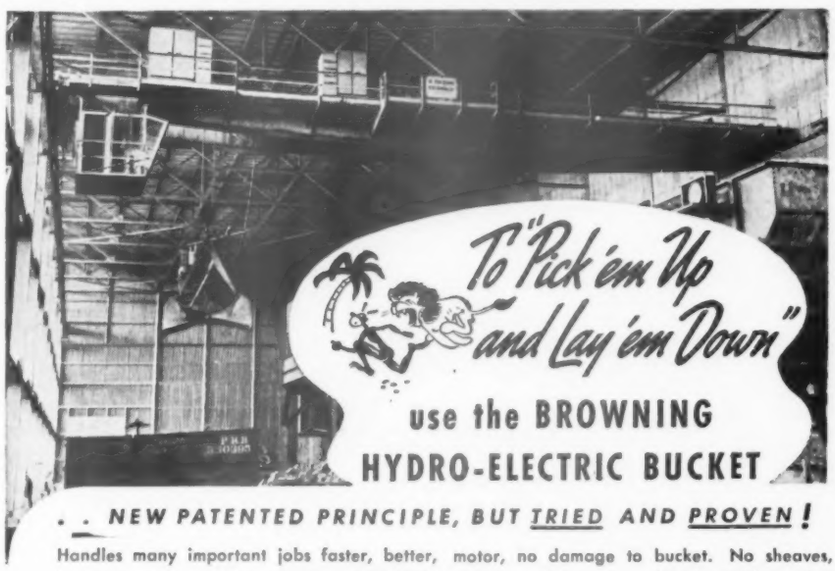

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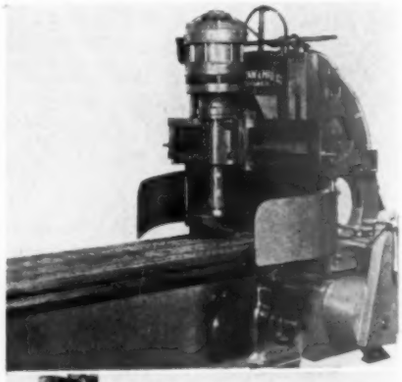
Analyzer: Applied Research Laboratories, 4336 San Fernando Rd., Glendale, Calif., and the Harry W. Dietert Co., 9330 Roselawn Ave., Detroit, Mich.,

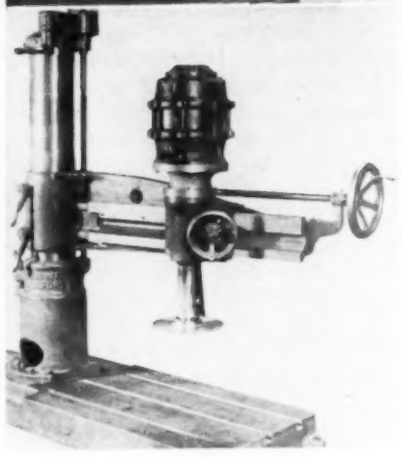
announce a new direct-reading instrument, known as the Quantometer, which allows the quantitative chemical analysis of as many as 11 elements in metal alloys, chemicals, and a wide variety of other materials in less than one minute. Results appear directly as percentage composition on a series of counters, one for each element being determined. Because of the unit's speed of operation many separate melting operations or the holding of melts while composition is being checked can be eliminated. Also, the alloys produced can be kept to narrow specification limits. The Quantometer consists of three units, a source unit which provides a powerful spark to the sample, a spectrometer which disperses the light from the spark into a spectrum, and a recording console where the final analyses are shown.

Goggle: Welsh Mfg. Co., Providence, R. I., has made several refinements in its fog-free goggle introduced a short time ago. These include an easily attached and removable tinted slip lens to provide glare protection and increase impact resistance. Interior design also has been modified to provide better fit and comfort for the wearer. Although not a respirator, the goggle covers the nose and filters out much dust by pads in the intake ports. Normal breathing provides a complete air change in the lens chamber about once every second. This air sweeps away moisture entering the chamber from around the eyes and prevents fogging on the lens' inner surface.

Pressure Gage: Manning, Maxwell & Moore, Bridgeport 2, Conn., has developed a new bellows type low-range pressure gage suitable for indicating draft pressures or any low pressures of gases or liquids that are not corrosive to bronze. Pressure element is a self-draining bronze bellows with a phosphor bronze calibration spring which makes an extremely sensitive and accurate gage. Adjustable stops protect the bellows from excess pressure or vacuum. It is supplied in 4½ and 6-in. phenol cases with ¼ in. male pipe thread lower or back connection, available in pressure ranges from 10 in. of water up to 10 lb pressure, or as a low range vacuum gage in vacuum range from 10 in. of water up to 20 in. of mercury vacuum.

Circular Saw: Thuro Sales Co., Swetland Bldg., Cleveland, O., as exclusive sales agents for the Acme Saw & Mfg. Co., is offering the units designed by the latter for cutting off gates and risers from nonferrous and gray iron castings. Making use of carboloy-tipped circular saws, the equipment is especially adapted to production work and to large castings. Risers up to 10 in. thick can be removed. One unit, shown in the upper view, employs a planer type machine converted to accommodate a special head directly connected to a 10-hp motor and equipped with an adaptor to hold the





saw blade. These saws are made in sizes up to 16 in. in diameter. Another method is to adapt the patented head to a radial type machine, shown in the other view, where greater flexibility is required. For special applications individually designed equipment can be provided. The saw works to close tolerance, minimizing subsequent grinding and machining, and provides high-speed cutting.

FORECASTS FAVORABLE OPERATIONS

(*Continued from page* 103)

reduced by introduction of these competitive techniques into manufacture of parts now usually cast. Over the longer-run period there is likely to be a trend, in some uses, toward displacement of castings, but the net effect upon the production of castings may not be great, assuming continued technical progress in casting methods and metallurgy.

Gray Iron—The outlook for production of gray iron castings in 1946 and 1947 is for the attainment of annual production totals somewhat higher than the peak wartime level. This would place the average yearly output at about 10,500,000 tons, or possibly somewhat higher if business conditions are especially favorable. The longer-run outlook is more uncertain. Present indications are that, after a number of years at this high rate of production, the trend of output will decline to some extent but remain considerably above the low level of 1939.

Demand for Gray Iron Castings

The foregoing expectation rests largely upon the relatively favorable prospects of a number of the more important industrial users of gray iron castings. The demand for gray iron is less concentrated than for other types of castings, being distributed among a wide range of industries. Several industries stand out as consumers of gray iron castings. The automobile industry was the largest peacetime user, its 1939 consumption of about 1,200,000 tons representing 20 per cent of the total (excluding cast-iron pipe and fittings). Most of this tonnage was produced in highly mechanized foundries operated by automobile companies. Gray iron castings are used primarily in the engines and chassis of automobiles and trucks, rather than in the bodies. Cylinder blocks and heads, crankshafts, and brake drums are illustrative. A substantial portion of gray iron output goes to the railway industry and railway-equipment manufacturers; the production of chilled iron railway wheels alone exceeded 500,000 tons in 1939.

In the machinery field, the machine tool industry is the most important consumer of gray iron castings, using them most frequently as bases and beds for the machines—parts large in area and usually of great weight. Machine tool manufacturers purchase most of these castings from independent foundries instead of operating their own foundries.

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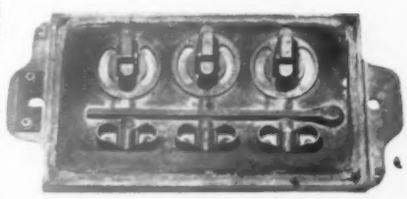

Above is an unretouched photo of a TAMASTONE Match Plate after thousands of castings have been run. Detail still perfect!

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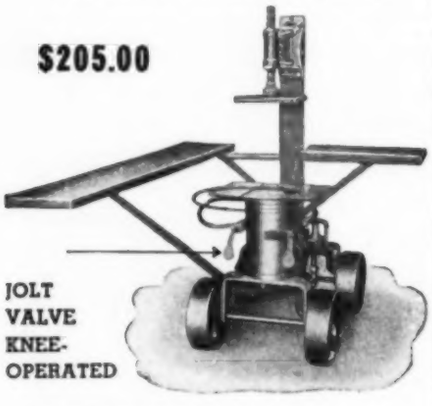

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During 1941, when the machine tool industry was approaching its wartime peak —a level far beyond peacetime totals— over 30 per cent of the gray iron castings produced by independent foundries was going into machine tools.

The basic steel industry is also one of the largest consumers of gray iron castings, using them principally for ingot molds and rolling mill rolls. The ingot molds are very large—usually weighing about 4 or 5 tons—and their useful life is relatively short. As a result, when steel operations are at a high level more tons of ingot molds are produced than of any other single gray iron product except cast iron pipe.

Gray Iron Used in War

Other large consumers are the stove, plumbing and heating equipment, tractor, and agracultural machinery industries, producers of many types of industrial machinery. During the war substantial tonnages of gray iron were consumed by the ordnance and shipbuilding industries.

Shipments of cast iron pipe and fittings—a specialized gray iron product—go principally to construction, including local water and utility systems. Many other types of gray iron castings are also used in construction.

The industries consuming gray iron castings face varying prospects in the postwar period. Many of the more important products using these castings have been curtailed during the war and have accumulated backlogs of demand. In other industries, the outlook is more doubtful, the general volume of sales of producers' machinery and equipment being the uncertain factor. The automobile industry, stimulated by pent-up damand, is expected to operate at unprecedented levels and its consumption of gray iron castings should be correspondingly high. The amount of castings going into railroad equipment should be substantially higher than before the war. Steel operations will probably be at high rates, although not up to the wartime peak unless industrial production is at very high levels. Other important industries whose consumption is likely to increase are the agricultural implement, tractor, stove, and household appliance industries, all of which have favorable postwar prospects.

The anticipated great expansion in construction activity should also contribute heavily to the demand for gray iron, especially cast iron pipe and fittings.

In contrast are some of the war-expanded industries whose consumption will probably show sharp decreases—ordnance, shipbuilding, aircraft. In the machinery field, the production of machine tools will undoubtedly be below the wartime record, although considerably above the depressed period of 1938 and 1939. In other types of industrial machinery, varying conditions will prevail, some of the industries having been greatly expanded during the war and others having a large proportion of their normal output curtailed. An active demand for gray iron should result from the restoration of full production in some of these latter industries—textile machinery and printing press machinery, for example.

Malleable Iron—Production of malleable iron castings should increase significantly—to as much as 25 to 30 per cent—above the 1944 total of 890,000 tons during 1946 and 1947 and remain at this level for several years thereafter. Later, after some of the accumulated demand has been filled, malleable iron production may taper off somewhat but is not likely to decline much below the peak wartime levels if conditions in the industries which consume the bulk of malleable iron castings are at all favorable. Wartime production represents a considerable increase over 1939, a depressed year, but output in 1941, a year in which almost all of malleable production was going to civilian products, was but slightly below that of 1943, 1944, and 1945. Production in 1929 also approached the wartime peak.

Tractors Absorb Large Amount

Most of malleable iron castings go in peacetime to industries that have favorable postwar prospects. In 1940, according to estimates of the Malleable Founders' Society, over half of these castings were consumed by the automotive industry, distributed fairly evenly between passenger cars and motor trucks and buses. The high levels of automotive production expected will have a stimulating effect upon the total demand for malleable castings. Another large segment of malleable production goes into the construction field, principally in the form of pipe fittings and equipment for electrical utility installations, such as pole-line hardware. Construction activity also is likely to be at extremely high levels.

Almost 10 per cent of the 1940 production was used in railroad equipment, and purchases by railroads are expected to be substantial for a number of years, especially since they have improved their financial position so considerably.

Agricultural machinery and tractor manufacturers comprise another substantiol portion of the market for malleable iron, consuming over 5 per cent of the output in 1940. The high rate of production anticipated for these industries should result in a strong demand for parts, including malleable iron castings.

Among the less important users, such as the manufacturers of industrial machinery, hardware, furniture, and stoves,

at least a moderately active demand may be expected from most; and there are no marked instances of particularly unfavorable trends.

Steel—During 1946 and 1947, and also over a longer period, production of steel castings will be at levels considerably below the high wartime totals. A substantial decline in output has already occurred since the 1944 output of 2,445,000 tons of steel castings for sale and for own use. Annual production will probably range between 1,400,000 and 1,600,000 tons for a number of years, although the total might go somewhat higher if business conditions are especially favorable. Although this level is far below that of 1944, it is considerably above the 1939 output of 822,000 tons. Production in 1937—a good production year—amounted to 1,399,000 tons.

The greater part of the record volume of steel castings produced during the war was allocated to the manufacture of military tanks, other ordnance, and ships. Production began to decline in 1944, when heavy cutbacks were made in the tank program.

Steel Casting Market Favorable

To offset the loss of demand from war products are the expected heavy requirements of steel castings for many peacetime products. Normally, almost a third of steel casting output is used in railroad equipment, but during the war this tonnage fell off considerably. Steel castings producers may be expected to share in a probable increase in equipment expenditures by many railroads. A large proportion of steel casting output is used in industrial machinery, for many types of which there is likely to be a strong demand. High rates of construction activity should also have a stimulating effect upon steel casting production, since these castings are used in many types of construction, as well as in construction and road-building equipment.

Aluminum and Magnesium — Production of aluminum and magnesium castings in 1946 and 1947 will probably be only a small proportion of peak wartime output (213,700 and 99,564 tons, respectively), but will continue to be far above prewar levels. Output of both these types of castings showed a tremendous expansion during the war, with many millions of dollars of new facilities added. Aircraft engines, whose peacetime production is likely to be but a fraction of the wartime requirements, consumed the great bulk of aluminum castings and, next to the production of incendiary bomb castings, were the most important factor in the demand for magnesium castings.

Some aluminum castings have been used in automobile engines and this consumption may increase in importance, but it is improbable that any demand for

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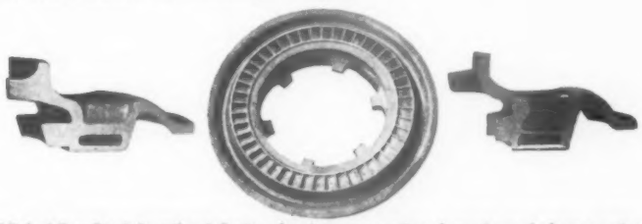

High Alloy Steel Centrifugal Casting showing cross sections formerly made from a series of forgings. This section 1/16-inch—100 per cent X-Ray inspection.

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this source can in the next several years offset the decrease in production for aircraft engines. Some aluminum household utensils are cast, but their production is relatively insignificant compared to the wartime totals. After the immediate decline from the war-expanded production totals, the output of aluminum castings should resume its gradual growth, with aluminum castings being specified in many fields where use of light metals is desirable.

Brass and Bronze—Production of brass and bronze castings will be at levels considerably below the wartime volume during 1946 and 1947. The trend of output will, however, remain much higher than in 1939. The volume of nonferrous metal castings was expanded during the war to many times the prewar level. Among the principal wartime uses have been parts for ships, including propellers and valves; bearings and bushings of many kinds; industrial valves and fittings; and ordnance. The consumption in shipbuilding should decline sharply. Valves and fittings, bearings and bushings, and castings for railroad equipment are important in peacetime, and consumption should be substantial under favorable business conditions. In addition, the postwar volume of shipbuilding is likely to be above the activity in the 1930's.

Technological Trends — In order to translate the anticipated volume of castings production into an estimate of future requirements for foundry workers, it is necessary to evaluate the effects of prospective changes in man-hour output. Although the output of castings per man hour is influenced by a number of factors —including the rate of foundry operations, the type and size of castings produced, and the quality of the labor force —in the long run, technological developments constitute the most important element in determining the relationship between employment and production.

In common with other industries' processes, casting is subject to continuous technological change, embracing wider utilization of previously developed equipment and methods which increase productivity, the improvement and refinement of existing techniques and apparatus, and the introduction of new types of machines and processes.

In general, molding machines find their most widespread use in the quantity production of light and medium weight castings of relatively simple shape. Except for the elementary devices, such as the squeeze and roll-over features, machine molding is often not adapted to intricate molds, and the original cost of the machines tends to restrict their use in jobbing.

Trends in the design of molding machines are toward the development of higher operating speeds, adaptability to larger and more intricate molds, and combination of a variety of mechanical aids in a single apparatus. These improvements will accelerate a long-run tendency toward wider employment of machine methods of molding. In the making of very large molds, hitherto requiring mainly hand operations, the sandslinger and other molding machines will be more extensively used.

Machine coremaking, like machine molding, is suited mainly to quantity operations and possesses the same primary economies of rapid production and minimum skill requirements. The use of coremaking machines is generally confined to the smaller and simpler structures; the limitations are roughly comparable to those of machine molding. Improvements in coremaking machines, increasing their versatility, speed, and automaticity, will result in continued expansion in their use. Apart from the mechanization of coremaking, coreroom operations will be affected by a trend in the design of castings toward elimination of complex interior shapes wherever possible, thus reducing the need for sand cores.

Materials in Constant Movement

Material handling provides one of the most likely fields for increased mechanization, in that the movement and manipulation of a large volume of materials are characteristic of foundry operations. In jobbing foundries, in which mechanization is ordinarily limited, the moving of lighter materials, such as small molds and cores, is usually accomplished by means of simple lifting and carrying or by hand-operated trucks; large molds and other heavy or bulky objects are transported by overhead and side-wall cranes. Production operations make use of a variety of material-handling devices, including electric tractors and lift trucks and, in the more highly mechanized establishments, of extensive belt and overhead conveyor systems. Stimulated by wartime labor shortages, the long-run trend toward installation of material handling equipment has gathered momentum.

In the cleaning, chipping, and finishing phases of the foundry process, mechanization has made substantial advances. The newer tumbling machines and blasting apparatus, which raise the efficiency of the cleaning operations, will be more extensively installed. Quicker finishing is provided by the growing use of improved grinding apparatus.

Modern furnace equipment and the wider use of conveyor systems in charging the furnaces increase the rate of melting operations. Efficiency in melting is also raised by greater use of duplex-

ing and triplexing, in which several types of melting units are successively used.

Technological developments tending directly to increase foundry employment include extension of the use of heat treatment and intensifying inspection and quality-control procedures.

Heat treating procedures improve the physical qualities of castings and provide a desired range of mechanical properties. The principal processes employed include annealing, normalizing, quenching, tempering, and flame hardening. Although one or more of these methods is applicable to most of the casting metals, the most important use has been in the making of malleable iron and steel castings. However, heat treatment of gray iron has increased markedly during recent years.

Man-hour output varies widely among foundries, reflecting the diversified nature of cast products, the distinction between jobbing and production methods, the differences between the smaller and the larger establishments, and the inevitable lag between the introduction of new methods and their widespread application. There is, nevertheless, a marked trend toward increased output per man-hour.

Reduces Number of Men

During the war, the high volume of castings production, the improved financial position of many foundries, and the continuing shortages of workers resulted in rapid and extensive advances in the substitution of machine methods for hand processes. Sales of foundry equipment—including molding and coremaking machines, new melting units, and cleaning and finishing apparatus — reached unprecedented levels.

Much more use was made of centrifugal casting, permanent molds, and other quantity-production techniques. However, output per man-hour showed little increase in foundries as a whole; a greater weight of castings was produced with relatively fewer workers, but this was achieved mainly by lengthening working hours. The scarcity of skilled workers and the lack of efficient unskilled labor largely canceled out the immediate advantages of mechanization. Nevertheless, with the return of normal operating conditions, the large volume of labor-saving equipment installed, and the new methods applied will affect the levels of foundry employment.

In the long run, technological developments will lead to a gradual reduction in foundry employment in relation to the output of castings. These effects will be variable. Jobbing operations are by their nature susceptible to only limited mechanization; in quantity production, a more marked decrease in labor requirements is probable. In relation to the end uses

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of castings, this will eventually mean that the greatest relative reductions in employment will occur in foundries serving the mass production industries, such as those making automobiles, plumbing and heating equipment, and household appliances; the labor force in establishments making castings for limited quantity uses, such as machine tools and special purpose machinery, will be less affected. Thus, the general level of foundry employment will depend upon the nature, as well as the magnitude, of the demand for castings.

One additional factor may be noted. If lower production costs, resulting from technological developments, lead to an expansion in the markets for castings, then increased output per man-hour may partially offset its own tendency to reduce employment.

Molding Departments Important

It is also necessary, in evaluating the effects of technical progress on foundry employment, to consider the relative importance, in terms of employment, of the various foundry operations. Molding departments are most important, accounting for roughly 30 per cent of all production workers in foundries. Coremaking employs about 10 per cent of the total. As noted, these departments are subject to substantial mechanization, not only of direct molding and coremaking processes, but also of many incidental handling operations.

Cleaning, chipping, and finishing account for nearly a fifth of the foundry workers. Requirements for unskilled labor in these processes gradually will be reduced, particularly in connection with materials handling. Labor requirements in melting operations eventually will show a moderate decline, but foundry employment as a whole will be little affected by changes in this relatively small department. Greater use of testing apparatus and other quality controls and more extensive application of heat treatment will increase employment in the numerically small inspection and heat treating departments.

Employment Outlook—In the immediate postwar years, the levels of foundry employment will be determined primarily by the volume and type of castings produced; technological change, typically a gradual process, will be a less-important factor. During this period, foundry activity as a whole will be at a very high level. However, production of gray iron and malleable iron castings is likely to be greater than the peak wartime output, and that of steel and nonferrous metal castings considerably below.

In addition, there will be a shift in the nature of the markets for castings. The anticipated high volume of consumer durable goods output and the expected increase in construction, both of which will contribute greatly to the total demand for castings, will require mainly the types of castings produced in large quantities. Castings for machine tools and other limited-quantity purposes will be relatively less important. Emphasis will thus be placed on the types of foundry operations in which output per man-hour is comparatively high, a development tending to reduce total requirements for foundry workers.

The effects of extensive mechanization of foundry operations during the war will carry over into the postwar period, but should not of themselves result in any immediate marked decrease in employment. A much more important factor is the probable return to about a 40-hour workweek, causing a substantial increase in the relative employment requirements of foundries.

Taking into account production prospects, technological factors, and the probable reduction of working hours, it appears that total employment for foundry workers during 1946 and 1947 will be slightly above the estimated number in July, 1945 (when the initial cut-backs in war production had already been felt). The total foundry employment anticipated for 1946-47 is somewhat lower than the 1944 peak, but far above the 1939 level. Increases are indicated for gray iron and malleable iron foundries, and decreases for steel and nonferrous foundries.

The forecasts for 1946-47 are compared with estimated employment in 1939, 1944, and July, 1945 in Table II.

In the longer run, say for 5 or 10-year period beginning about 1950, total foundry employment will probably show a moderate decline from the immediate

TABLE II.—Estimated Foundry Employment in Selected Periods

Type of foundry	Estimated number of production workers			
	1939	1944	July 1945	1946-47 (average)
All foundries	255,000	425,000	375,000	365,000-400,000
Gray-iron, including cast-iron pipe	150,000	160,000	155,000	185,000-200,000
Malleable-iron	30,000	40,000	37,000	55,000- 60,000
Steel	40,000	100,000	78,000	70,000- 75,000
Nonferrous-metal	35,000	125,000	105,000	55,000- 65,000

Estimates include workers in both captive and independent foundries and are based on current product classification; therefore, they cannot be related to the published foundry-employment series of the Bureau of Labor Statistics, which cover only independent foundries and are based on 1939 product classification.

postwar level, but will remain well above 1939, if general business conditions are favorable. After the accumulated demands for certain durable goods have been met, the distribution of employment among the major classes of foundries will tend to return to the prewar pattern. For this reason, employment in gray iron and malleable iron foundries, greatly expanded in the immediate postwar period, will probably be reduced. On the other hand, employment in steel castings, having been sharply deflated in the first peacetime year, will tend to remain fairly stable; employment in nonferrous casting, after the initial postwar drop, will show a gradual moderate rise.

In the long run, technological developments will become a highly significant factor affecting employment. There will be a gradual but steady increase in castings output per man-hour which, in a period of stable or declining output, will lead to further reductions in employment. There is also the possibility that the rivalry between casting and alternative methods of fabrication may result in some net loss of foundry markets.

There is no indication, however, that this gradual decline in foundry employment from the high levels of the immediate postwar period, which may continue over a period of many years, will result in the loss of jobs for any significant number of foundry workers, although the number of openings for new workers will be diminished.

Because of such factors as the extent to which workers can readily transfer from one type of foundry to another, the replacement demands resulting from death, retirement, and labor turnover, and the demand and supply affecting individual occupations, information on the trend of total foundry employment does not of itself provide an adequate basis for appraisal of the opportunities for employment in foundries.

Acquires New Valve Division

Ashton Valve Co., Cambridge, Mass., has acquired the valve division of the Lombard Governor Corp., Ashland, Mass. Cast iron, steel, bronze and stainless steel relief valves will be manufactured at the Ashton main plant in Cambridge, under the Ashton name. John F. String, formerly valve sales manager of the Lombard Governor Corp., has joined the Ashton Valve Co.

Beloit Castings Co., 1546 Henry Ave., Beloit, Wis., has let contract to Luety Bros., that city, for construction of a new one-story foundry building of brick and concrete.

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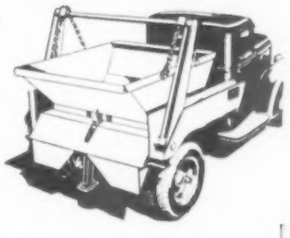

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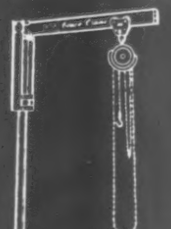

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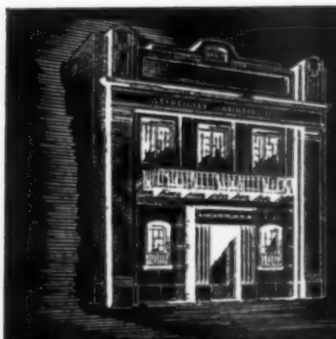

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NEW TRADE PUBLICATIONS...

ALLOYS: Baldwin Locomotive Works, Cramp Brass & Iron Foundries Division, Paschall Post Office, Philadelphia 42, has available a 44-page engineering reference catalog, Bulletin 194, of brass, bronze and iron alloys. Composition, applications and physical properties are given for nonferrous and ferrous alloys most commonly used in industrial and engineering applications. Terms used in material testing, and formulas useful in calculating weight of castings are supplied.

WELDING ELECTRODE: A new bulletin, W-7, issued by Ampco Metal Inc., Milwaukee 4, describes a shielded arc, phosphor bronze welding electrode. Views of typical welds and tests, weld deposit physical properties, recommended amperage, welding procedure and typical applications are contained in the bulletin, which is available on request.

THERMOCOUPLES: Wheelco Instruments Co., Chicago 7, has issued a new edition of its Thermocouple Data Book and Catalog, S2-6, which gives information on selection of proper thermocouples and includes installation aids, list prices and recommendations on thermocouples, thermocouple wire, lead wire, heads, connectors, plug and socket assemblies, insulators and protecting tubes.

DUST CONTROL: Bulletin No. 100, recently published by the W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, is a colorful 4-page circular which describes dust control filters for abrasive grinding and polishing, packing operations of cement, food products, etc., tumbling mills, sandblasting, mixing of compounds in rubber manufacturing, loading box cars, bins and hoppers.

MARKING EQUIPMENT: Acme Marking Equipment Co., 2222 West Fort St., Detroit 16, has available a new catalog which describes a complete line of marking equipment including steel stamps and type holders, machine stamps, marking machines, hobs, molds, embossing dies, numbering heads, branding irons, etching equipment, shipping supplies and stencils, seals, punches, rubber stamps, name plates, tool checks and badges.

BRONZE TABLETS: An attractive 6-page leaflet, in color, has been published by the Willard Bronze Co., 3608-16 Colerain Ave., Cincinnati 23, which suggests ideas for simple tablets or elaborate monuments, appropriate to the requirements of industrial and commercial corporations in perpetuating the memory of members who served with the armed service.

FOUNDRY WHEELS: A new folder issued by Norton Co., Worcester 6, Mass., describes a new resinoid wheel for foundry grinding which combines fast cut and long life. Known as the B-5, the new wheel is adaptable to use on swing frame, portable and disc grinders for work on various types of castings.

MOTOR: Crocker-Wheeler Division of Joshua Hendy Iron Works, Ampere, N. J., offers a 4-page bulletin which describes a new electric motor developed for use in dusty locations and in places where there is excessive moisture, for all applications where ac, totally enclosed, fan cooled motors have been used before, available in sizes from 2 to 15 hp.

ELECTRODES: "Arc Welding Electrodes," a new 32-page illustrated catalog, has been published by Wilson Welder & Metals Co. Inc., 60 East 42nd St., New York 17, which supplies complete data on proper electrodes to be used for all types of work on a wide variety of base metals, and describes approved welding procedures for each application.

OXYACETYLENE PROCESSES: A completely revised edition of "New and Improved Oxyacetylene Methods for Steel Foundries," has been issued by Air Reduction Sales Co., 60 East 42nd St., New York 17. The 30-page illustrated booklet contains descriptive information on the advantages of machine flame cutting and equipment used in removal of risers, gates and sprues, describes flame scarfing to remove padding left where risers have been removed, flame gouging for removal of webs, fins and defects, and flame descaling of normalized and annealed castings.

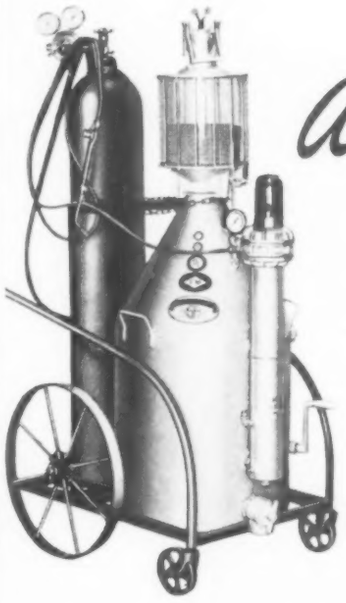
LOAD HANDLING: Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 14, has available four new bulletins which deal with the logistics of boxes, barrels, bags and bales, for handling material to be transported. The purpose of the bulletins is to assist manufacturers and distributors to determine the best form and methods of load handling.

VALVES: Farris Engineering Co., 400 Commercial Ave., Palisades Park, N. J., offers a complete line of safety and relief valves in a new catalog, No. 45, recently published. A ready reference pictorial index chart shows line drawings of all basic valve types with detailed index showing uses for each type. A condensed bulletin and price sheeet is contained in a supplement.

LABORATORY WARE: Norton Co., Worcester 6, Mass., offers an 11-page, illustrated booklet, Form 793-2P-10-45-5M which describes laboratory ware developed in a new raw material made from fused alumina. Ignition crucibles and capsules, incinerating dishes, melting crucibles, flame collars, filter cones, dishes and discs, are among the many examples illustrated.

WELDING ACCESSORIES: Air Reduction, 60 East 42nd St., New York 17, has available a new price list and catalog of arc welding accessories which includes electrode holders, graphite electrodes, welding cable, cable connectors and cable lugs. Also listed are welding helmets, goggles, face shields, headgear, aprons, gloves and sleeves.

MASONRY: Prepared by the engineering staff of U. S. Stoneware Co., Akron 9, Bulletin 810, is full of helpful facts and suggestions pertaining to corrosion-resistant materials and construction methods for tanks, towers, sumps, floors and other masonary construction.



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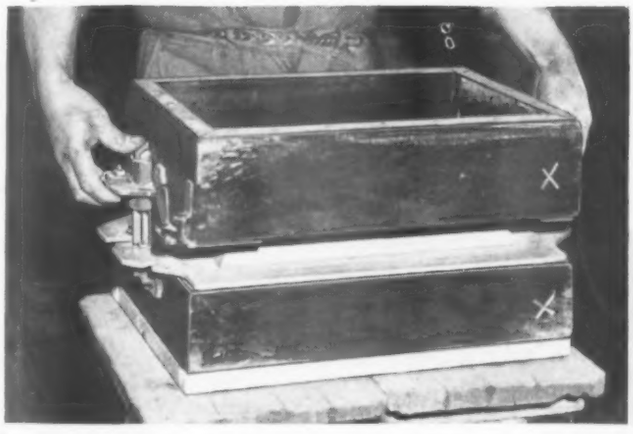

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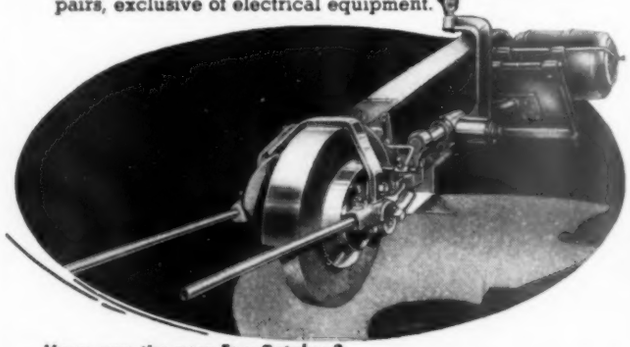

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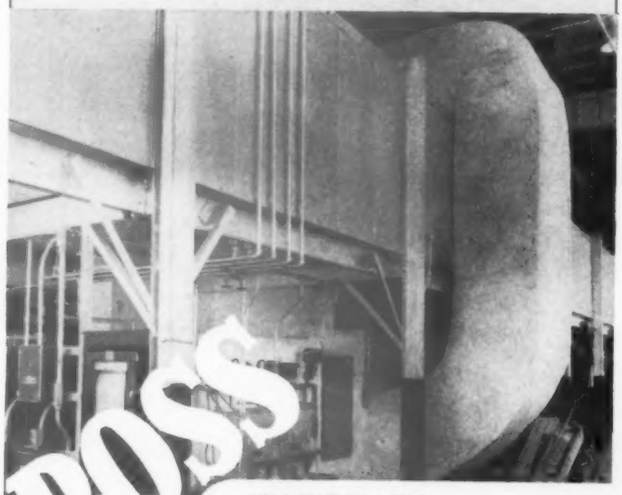

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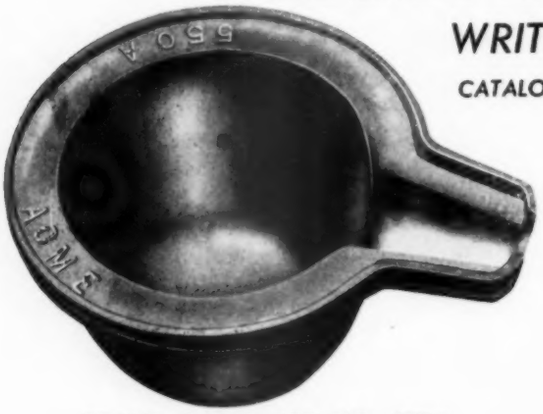

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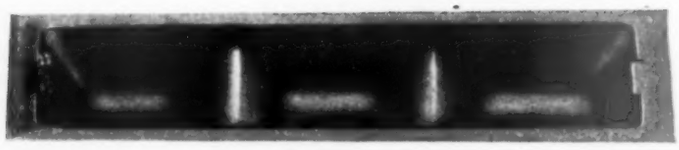

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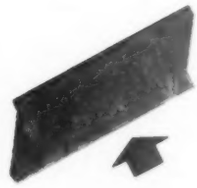

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NEFF & FRY BINS

WOOD PATTERNS COATED WITH *HARDLAC* ARE *REALLY PROTECTED*

Hundreds of leading Pattern shops and Foundries acclaim this modern coating.

PREVENTS warping, swelling, wear and deterioration.
PROTECTS AGAINST oils, water, waxes, kerosene and gasoline.

Yes, Hardlac answers every requirement for a safe, ready-to-use pattern coating. This specially developed McDougall-Butler product brushes easily, dries quickly to provide a smooth even protective coating on any wood pattern. Molding sand won't stick to a Hardlac surface even when packed by "slinger" or tamp methods. Save time—save disappointments—start HARDLAC-ing your patterns right away.

Made in clear and standard colors red, yellow and black to conform with A.F.A. recommendations. Write for name of your nearest supplier.

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BUFFALO, NEW YORK

How wise foundries REDUCE REJECTIONS

An unjust rejection, based on unsightly surface blemishes, when the casting itself is absolutely sound and strong internally, is a headache you can avert, as do experienced foundrymen all over the country, by using Smooth-On No. 4 Foundry Cement.

Use it like putty to true up sand holes, blow holes, pock marks, dented contours and other irregularities that are actually harmless, but spoil good looks. You can match color and texture with a surface that will last as long as the casting and even take filing or machining. And at very little expense.

CHOOSE YOUR SHADE

Choose Smooth-On No. 4AA for light gray castings. Has fine grain, high lustre. Machines perfectly. 1-, 10- and 50-lb. sizes.

Choose Smooth-On No. 4A for medium gray castings. Close grain, good lustre, 1-, 5-, 25- and 100-lb. sizes.

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TRY IT FREE

To any foundry that has not yet used Smooth-On No. 4, we'll send, without charge or obligation, sufficient Smooth-On to make a conclusive test. Check the grade you want to try and mail us the coupon. We will send also hardened specimens of Smooth-On No. 7 and the famous 40-page, pocket size Smooth-On Repair Handbook, describing the full line of Smooth-On Iron Cements and showing dozens of time-saving, money-saving uses.

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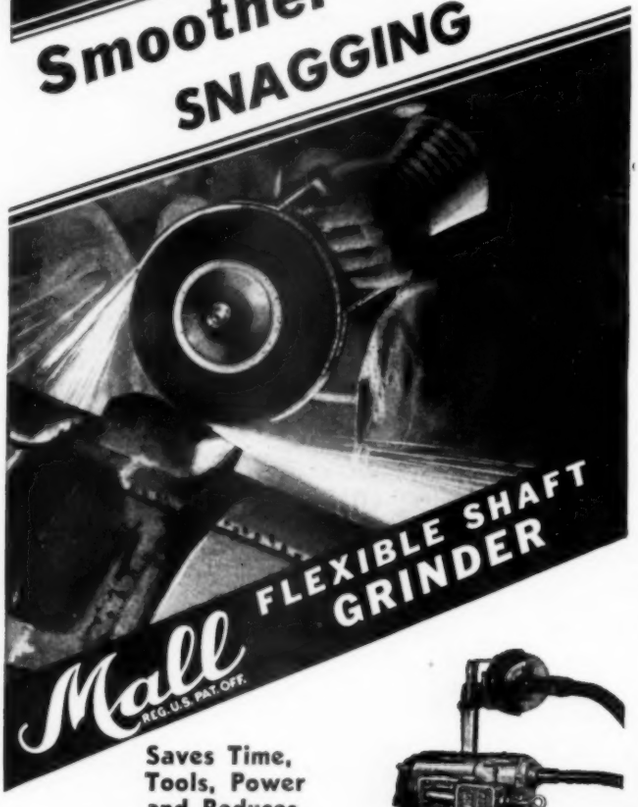
Smoother · Faster SNAGGING



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★ PORTABLE—can be rolled right up to the work—thus saving steps and materials handling.

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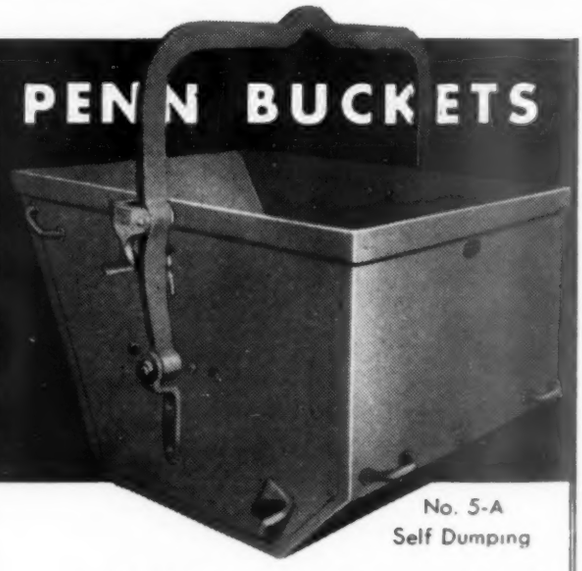

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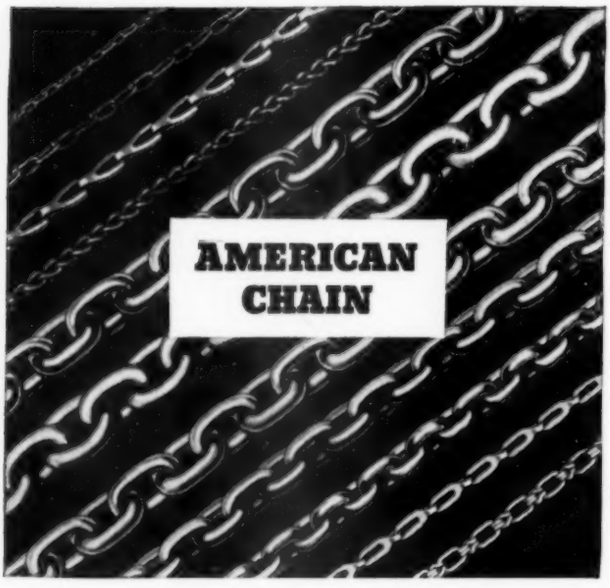

There's more to a chain than material, type and size. Equally important are the experience and facilities of the manufacturer who made it. For these affect chain quality. The war greatly increased the quantity of chain produced by American Chain Division. But nothing will ever lower the quality of ACCO Welded Chain, Weldless Chain, or Attachments. We will not compromise with quality. On the contrary, our research department is constantly endeavoring to improve the quality of American Chain, thereby increasing its service to the user.

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In both Double (shown) and Single Head types of "Buffalo" *LEEK-PRUF* Chaplets, the chief factor of efficiency is the exclusive fin design.

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CATALOG NO. 12

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Is your sand sticky? Seco patented auxiliary vibrator enables efficient, trouble-free screening.

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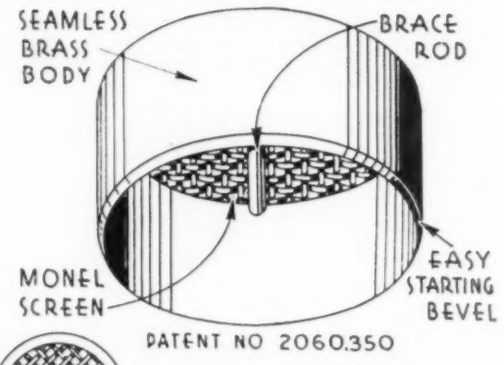

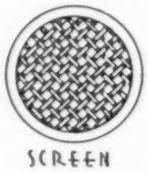
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Sinel Screen Vents, the original patented screen plugs, give maximum venting area with minimum hole size in the box. Our method of inserting the screen does not restrict the inside diameter and the resulting open area requires less frequent cleaning. Made in sizes to meet all needs. Write for complete information and latest price list.

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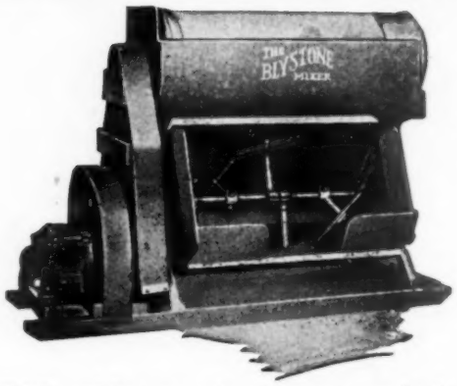

THE paddle-type mixer for core sand mixing in the foundry. Blystone Mixers offer: low mix cost, thorough mixing, and easy operation. There is a sturdily built type and size for your problem. Send for the new Bulletin and full details.

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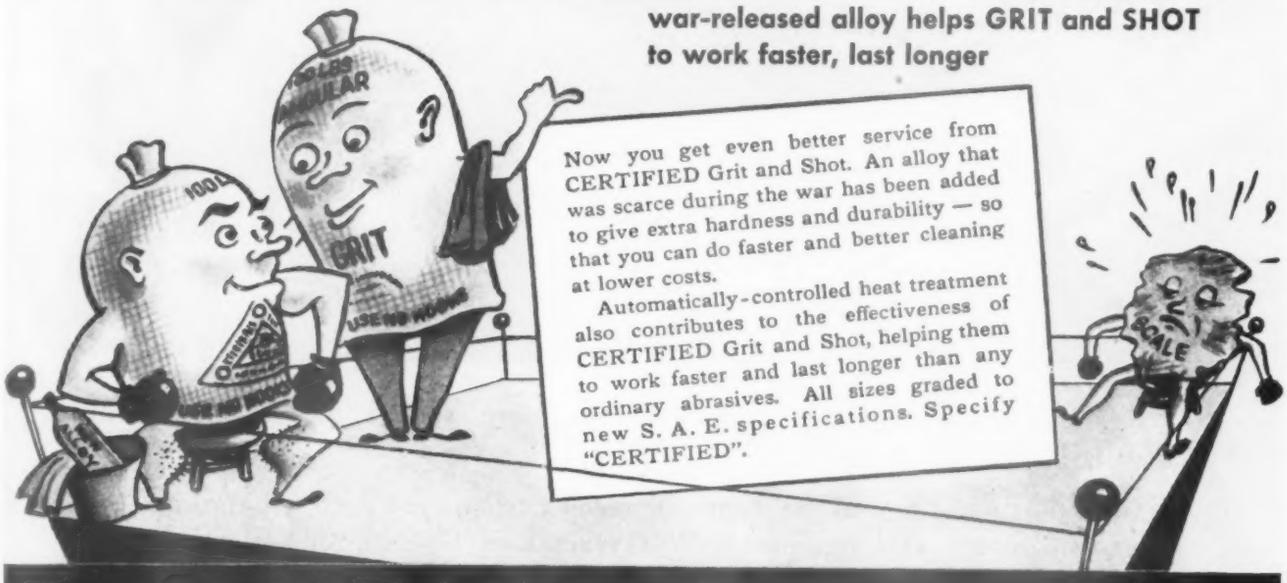
THERE'S A NEW PLUS IN THEIR PUNCH

war-released alloy helps GRIT and SHOT to work faster, last longer



Now you get even better service from CERTIFIED Grit and Shot. An alloy that was scarce during the war has been added to give extra hardness and durability — so that you can do faster and better cleaning at lower costs.

Automatically-controlled heat treatment also contributes to the effectiveness of CERTIFIED Grit and Shot, helping them to work faster and last longer than any ordinary abrasives. All sizes graded to new S. A. E. specifications. Specify "CERTIFIED".

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RADIUM RADIOGRAPHY *Performs a* NEW FUNCTION

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Write us concerning any problem of Gamma Ray Radiography

"Directional solidification" can easily be studied by the set-up illustrated in the photograph—to indicate the best method of casting with a minimum of defects in the casting itself.

Radium has become a new foundry tool which directly effects an increase in yield. It permits accurate determination of the proper procedure in gating and risering "tough" castings. Seventeen cylindrical castings were radiographed simultaneously by Crane Co. to ascertain the most productive and economical foundry practice.

Radium thus performs a valuable additional function.

For inspection, for determination of directional solidification, Radium is available in capsules of various unit strength in duralumin holders which may be leased or purchased at low rates.

The rental includes full coverage insurance, heavy lead storage containers and slide rule exposure calculators.

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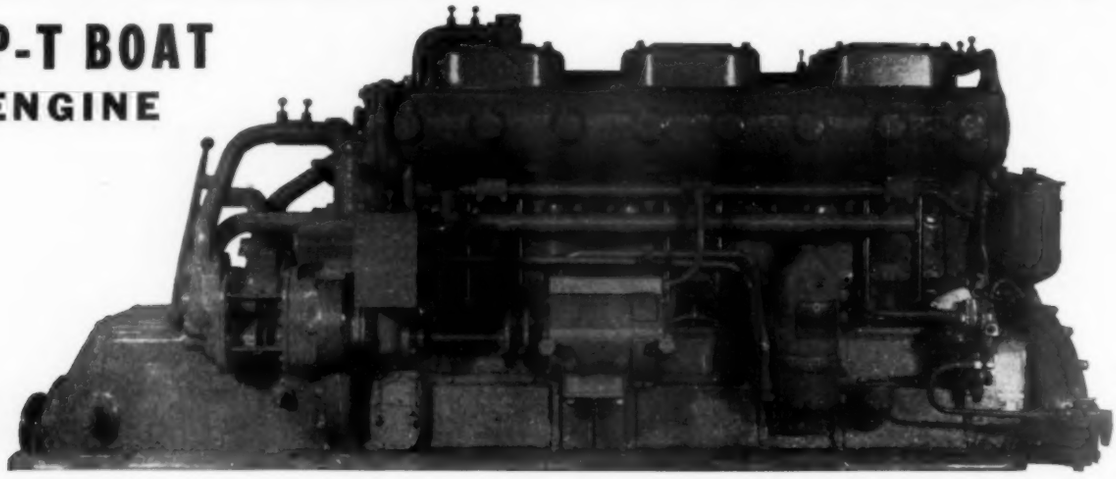
A P-T BOAT ENGINE



The Castings used in these engines were sealed pressure-tight with WATERLOX TRANSPARENT.

WATERLOX seals all types of metal castings for auto or airplane engines, machinery and equipment at a savings of time, labor and production costs.

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A Revolutionary Machine for both Wood and Soft Metals

This "Oliver" Pattern Miller has unusual range and capacity. It is sturdy, and convenient to operate. Handles practically every operation in pattern making, including cutting core boxes, fillet cutting directly into pattern, and many intricate operations formerly requiring tedious hand work.

Write for 12-page Bulletin No. 103

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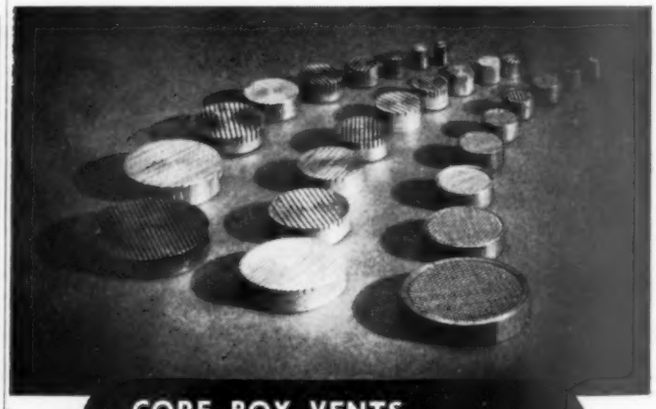

CORE BOX VENTS TO FIT EVERY NEED

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock!

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Slot widths: .010", .013", .015"
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STEEL SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SCREEN TYPE CORE BOX VENTS
Mesh: #30, #40, #50.
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

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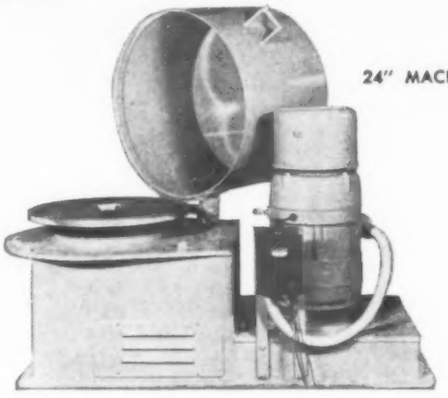
VERTICAL, HORIZONTAL

Designed and built to meet specific requirements for steel, gray iron, malleable and all nonferrous metals.

The most progressive foundries are already investigating the possibilities of Centrifugal Casting on their product.

For better castings, increase furnace yield, less scrap, reduced machining cost.

We have engineers available to make complete studies to determine investment, production cost, and make recommendations.



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EFFECTIVENESS AND ECONOMY THAT'S AMAZING

Our Exclusive Scientific Heat Treatment makes 20th Century Blast outstanding in toughness and durability. You can depend on it to hold to the size you select for most effective cleaning—longer. All sizes graded to new S.A.E. Specifications.

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are scientifically blended—laboratory tested. *FLUXES* for melting, protecting, refining and degassing *aluminum, brass, bronze and grey iron alloys. A. B. C. FOUNDRATE FLUXES* assure *more* metal in the castings —*less* metal in the skimmings. Results are better castings at lowered costs.

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MICAWASH and MICAPARTE for core and mold washes—also parting compounds —for all ferrous and non-ferrous alloys. (Contain no free silica.)

COATING COMPOUNDS for die casting —permanent molds—forging dies—centrifugal casting.

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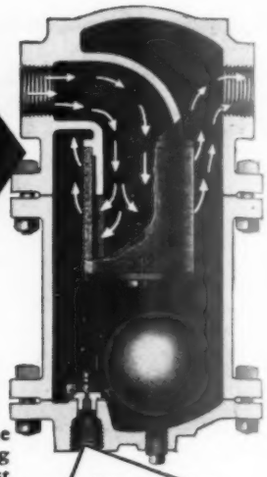

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Self-Draining—a simple but complete trap mechanism built right in, automatically drains separator whenever necessary.

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CORE VENTING is No Problem FOR BUFFALO BRAND VENT WAX

The quickest, surest way to eliminate costly losses of castings due to core blowing is to *provide* cores with an ample amount of clean, positive vents. That's why Buffalo Brand Vent Wax has been in use in so many leading foundries for more than thirty-five years. Made in two shapes and eighteen sizes to meet any venting requirements. Write for sample today!

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HELPFUL LITERATURE

NOTE TO READERS: If you will check the item or items described which particularly interest you, we will be glad to request the manufacturers concerned to send you their literature. Use the attached postal card

1. Conveyors

Standard Conveyor Co.—12-page illustrated bulletin No. 66 shows typical installations of conveyors in foundries, steel mills, machine shops and airplane plants. How various types of power and gravity roller conveyors and pneumatic tube installations facilitate production and expedite work are explained.

2. Mobile Crane

Hughes-Keenan Co.—Four illustrated bulletins on Roustabout cranes give specifications and show typical uses of this materials handling unit which can be furnished mounted on wheeled or track type tractors or mobile power units. Capacities and sizes are available for practically all load handling requirements.

3. Sand Blowers

International Molding Machine Co.—6-page illustrated folder "Sand Blowers" shows and briefly describes various models which are engineered for specific core-making requirements. Details are given also on vibrating type sand hopper and roll-out conveyor which facilitate production of cores.

4. Centrifugal Casting

Centrifugal Casting Machine Co.—4-page illustrated bulletin No. 545 presents details of model J-P centrifugal casting machine which is designed to accommodate flasks from 3 to 6 inches in diameter and 4 to 7 inches in length. Power is supplied by 2-horsepower motor which delivers casting speed of approximately 375 revolutions per minute.

5. Air Compressors

Schramm Inc.—44-page illustrated catalog No. 45 is entitled "Schramm Portable and Stationary Air Compressors." Design, features, compressor and engine specifications, available mountings and other data are given on complete line of compressors for practically any foundry or other application.

6. Overhead Materials Handling

Forker Corp.—12-page illustrated bulletin No. 100 describes components of Ohio tramrail systems which are designed for wide range of overhead materials handling applications. Data are given on below-the-hook devices, rail sections, ceiling fittings, tramrail electrification, switches, yoke assemblies, hand propelled trolleys and tramrail cranes.

7. Fire Brick

Ironton Fire Brick Co.—4-page illustrated bulletin on "Ironton Steel Fire Brick" describes properties of this refractory material which is designed for wide range of applications. Bricks have uniform texture and nonglassy structure.

8. Hydraulic Elevating Table

LYON-Raymond Corp.—Illustrated folder No. 141 describes hydraulic elevating tables capable of elevating loads of 2000 pounds from lowered height of 23 inches to elevated height of 43 inches. Typical applications are shown. Information about optional equipment for specific applications is presented.

9. Dust Control

Claude B. Schneible Co.—20-page illustrated bulletin No. 310 describes Multi-Wash equipment for control of dust fumes and odors. Advantages of wet method of dust control are explained. Data are given on dust collectors, settling and dewatering equipment, sludge pumps, entrainment separators and portable dust and fume collectors. Typical installations are shown.

10. Foundry Equipment

Baker Perkins Inc.—4-page illustrated bulletin "Baker Perkins Foundry Equipment" describes and gives available sizes of core sand mixers, continuous mullers, flow controls, sand scales, heat treating ovens and core ovens.

11. Aluminum Alloy

National Smelting Co.—8-page illustrated bulletin on "Allcast Aluminum Alloy" gives history, advantages, mechanical properties and recommended applications of this general purpose aluminum alloy which has nominal composition of 3 per cent copper and 5 per cent silicon. Test results of physical properties are tabulated.

12. Gagger Bars

Joseph T. Ryerson & Son, Inc.—1-page illustrated data sheet on "Hi-Bond Gagger Bars" describes double-reverse helical rib pattern of these bars which is claimed to provide maximum mechanical grip as well as greatest bonding surface for given cross section. Because of low carbon content, bars can be reshaped and reused many times.

13. Air Separator

Swartout Co.—4-page illustrated bulletin No. S-13 describes Airfuge combination air separator and trap for users of compressed air tools and operations. Need for clean dry air for protection of pneumatic equipment is discussed.

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14. Gas Welding & Cutting

Air Reduction Sales Co.—30-page illustrated booklet is entitled "New and Improved Oxyacetylene Methods for Steel Foundries." Advantages of machine flame cutting for removal of risers, gates and sprues are explained. Flame scarfing, flame gouging and flame descaling methods are described and typical steel foundry applications shown. Oxygen lancing to start openings, flame hardening and other methods are covered.

15. Industrial Furnaces

W. S. Rockwell Co.—Five illustrated catalogs give specifications and application data on several industrial furnaces. Bulletin No. 413E describes standard electric oven furnaces with temperature range of 600 to 1800 F. No. 413L covers details of standard oil fired oven furnaces and No. 413G describes gas fired types. Bulletin No. 417 gives data on gas, oil or electric Kleenmetal oven furnaces for use with protective atmospheres. No. 419 describes line of roller hearth furnaces.

16. Tungsten Steel

Molybdenum Corp. of America—92-page illustrated technical reference book entitled "Tungsten in Steel" contains engineering and application information on production and principal uses of tungsten. Properties of metallic tungsten are tabulated. Effect of tungsten in alloys is discussed thoroughly. Tables and charts amplify text to show physical properties and other data on various alloys.

17. Safety Equipment

Mine Safety Appliances Co.—178 page catalog B-6 describes and shows complete line of safety equipment for industrial applications. Both standard and pocket-size editions are available. Many new products are listed for first time. Information is presented on company's research and production facilities.

18. Portable Pyrometers

K. H. Huppert Co.—4-page illustrated bulletin describes portable lance or prod type pyrometer which is adaptable for measuring temperatures of up to 2000 F. Compact and easy to use, this instrument can be furnished with wide range of thermocouples for practically any application.

19. Cutting Electrodes

Ellwood Products Corp.—4-page illustrated bulletin describes Ellpro cutting electrodes for underwater or surface cutting. Efficient in cutting of cast iron, there is no need for preheating. Cutting speed is said to be three times faster than former methods. Specifications and methods of use are presented.

20. Toolroom Grinding Wheels

Macklin Co.—32-page illustrated catalog No. T-45 describes toolroom grinding wheels bonded with V5 and V6 improved bonds. Produced in many structures or degrees of porosity, wheels are available for all types of toolroom grinding. History of development, specifications and recommended uses are covered.

21. Foundry Equipment

American Foundry Equipment Co.—24-page illustrated reference catalog No. 40 presents entire line of company's equipment. Equipment described includes Wheelabrator Airless blast cleaning equipment, Wheelpeening equipment, metal washing equipment, Dustube cloth bag dust collectors, Sandcutters for conditioning sand, rod straightener and shear machine, and Airblast Long Lyfe nozzles. Operating views of typical installations are shown.

22. Foundry Trucks

Chicago Mfg. & Distributing Co.—4-page illustrated bulletin describes CMD core-barrows, bag-holding trucks, resilient core racks and pneumatic core trucks. All of these materials handling units feature spring suspension which absorbs shocks and minimizes breakage. Wide range of sizes and capacities is listed.

23. Dust Control

W. W. Sly Mfg. Co.—4-page illustrated bulletin No. 100 describes dust control systems and elements required, suggests methods of engineering dust problems and shows typical installations. Four types of Sly dust filters are described briefly. Sandblast equipment and tumbling mills are also covered.

24. Sand Mixers

Clearfield Machine Co.—32-page illustrated catalog No. 77 contains complete data on muller type mixers for conditioning foundry sand and other materials. Included is treatise on preparation of foundry sand. Typical installations, specifications and other pertinent information are given.

25. Colloidal Graphite

Acheson Colloids Corp.—12-page illustrated bulletin No. 430-XX describes physical and chemical properties of "dag" colloidal graphite, how it differs from other forms of graphite, and discusses its use in industry as parting compound, for impregnating porous bodies, for high temperatures, electrical applications and running-in engines.

26. Casting Sealer

Metallizing Engineering Co. of America—2-page illustrated bulletin No. C-1A gives data on model M-1500 Mogul Circulator which provides means for salvaging castings rejected because of porosity, fissures or pinhole cracks. Unit injects Cast-Seal colloidal solution under pressure through defective castings. This material seals openings for life of casting.

27. Mold Pouring Screen

Briggs Clarifier Co., Ceramics Div.—8-page illustrated bulletin on "The Briggs Ceramic Filterscreen" describes this ceramic coated metal screen through which molten metal is poured into mold. It will resist extreme heat shock of molten metal at pouring temperatures up to 2500 F. Casting defects are minimized by retention of dross. It also affords even, controlled flow of metal.

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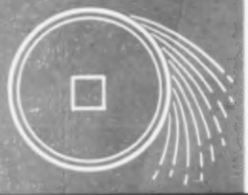

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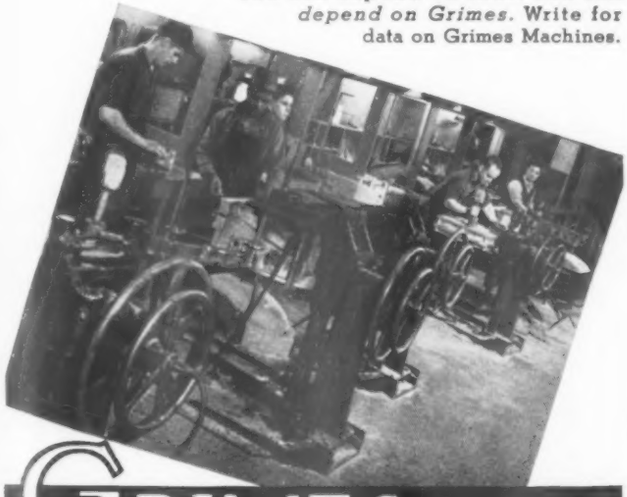

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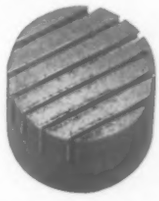
CORE  BOX

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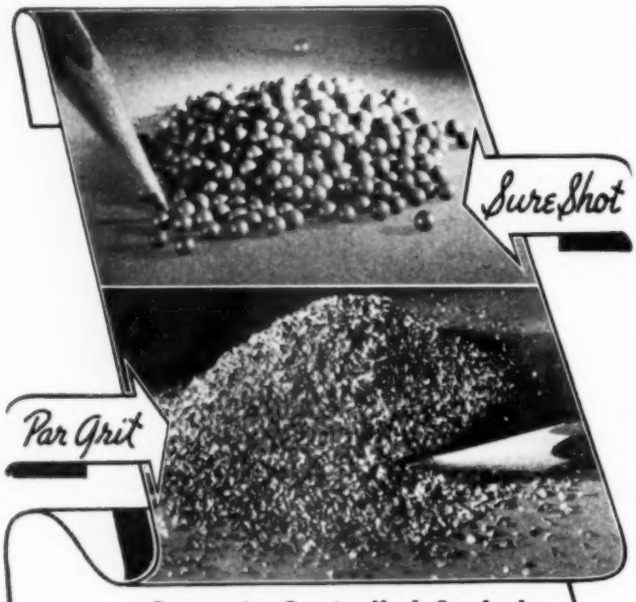

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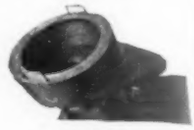
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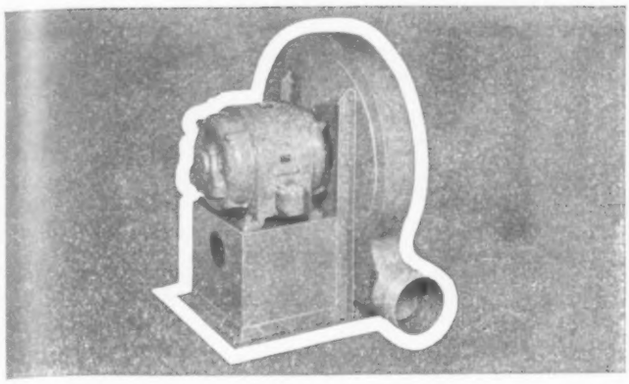

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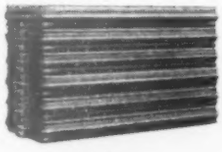

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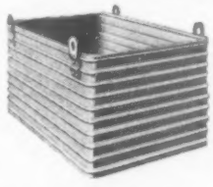

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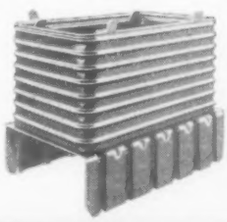

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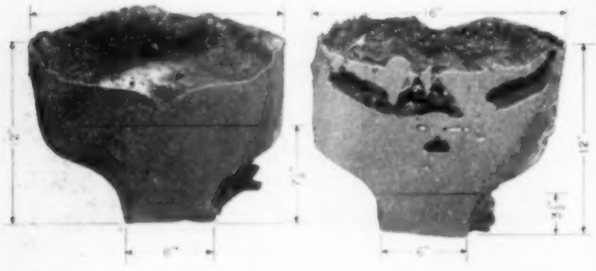

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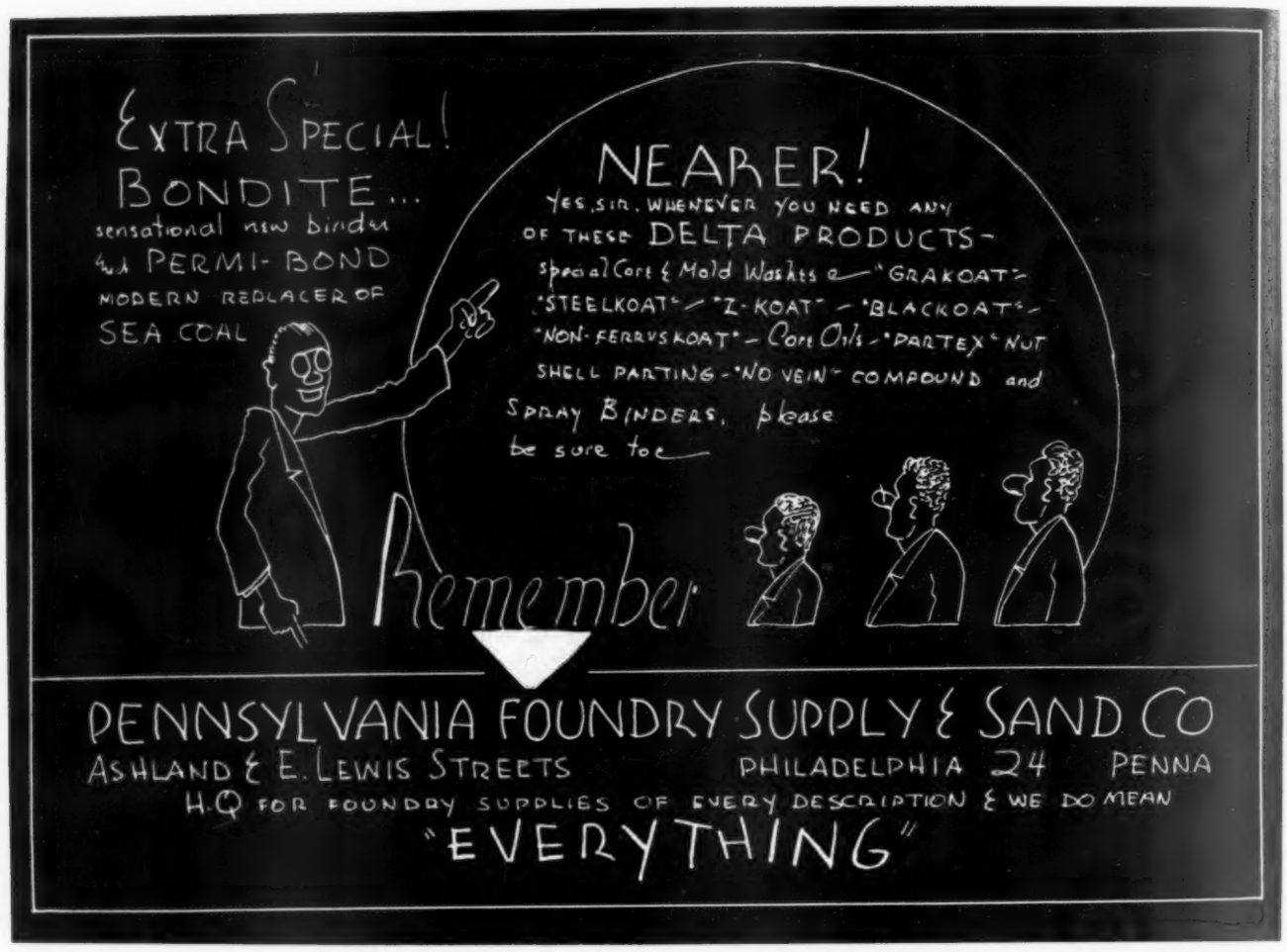
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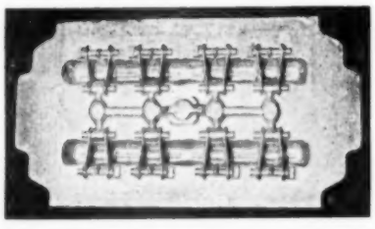

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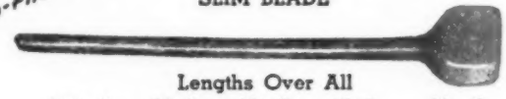

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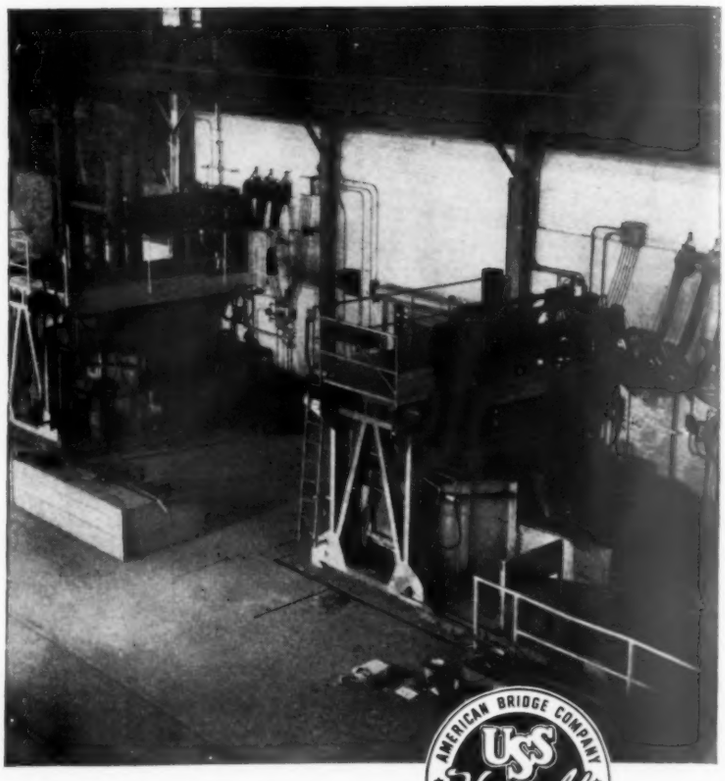

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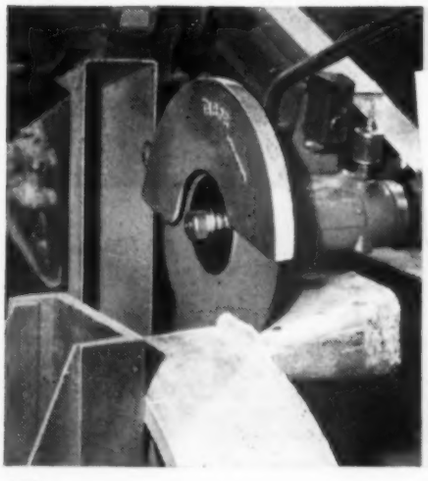

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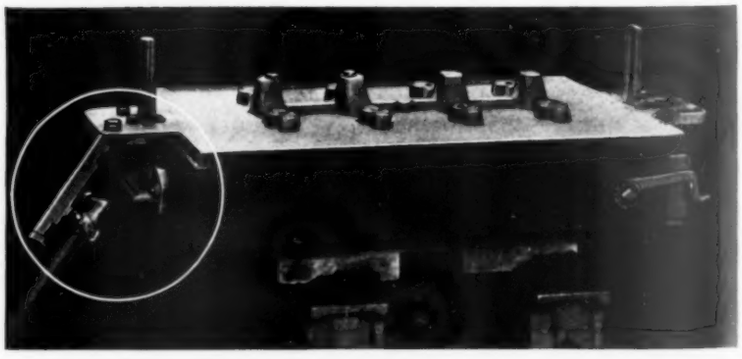

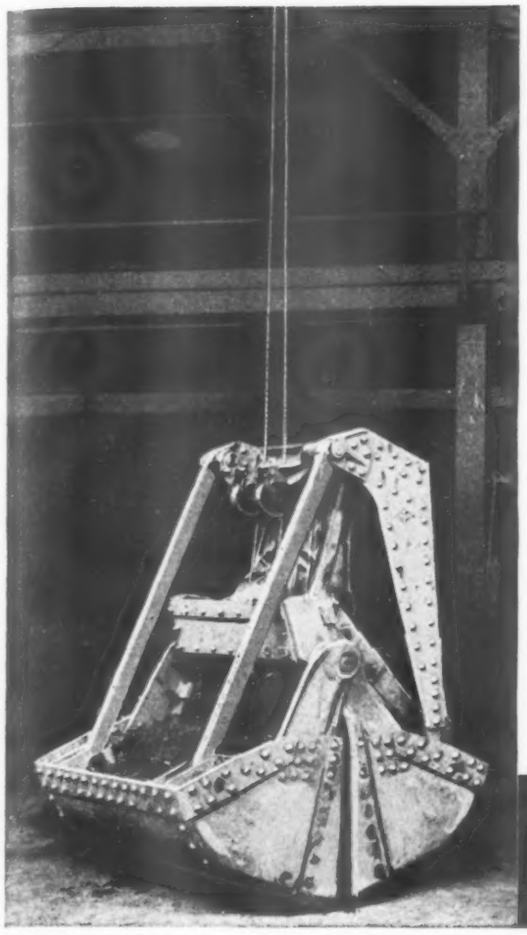

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Norton Co., Worcester 6, Mass.
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Carborundum Co., Niagara Falls, N. Y.
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Electric Furnace Co., W. Wilson St., Salem, Ohio.
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Safety Grinding Wheel & Mach. Co., Springfield, O.
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U. S. Electrical Tool Co., Cincinnati 4, O.

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Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

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Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, O.
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SAND SIFTING and SCREENING MACHINERY

Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kansas.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.
Screen Equipment Co., Buffalo, N. Y.
Simplicity Engineering Co., Durand, Mich.
Pangborn Corp., Hagerstown, Md.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

SAND STORAGE BINS & GATES

Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Neff & Fry Co., Camden, O.

SAWS (Band, Metal, Wood)

Oliver Machinery Company, Grand Rapids 2, Mich.

SAWS (Cold Metal)

Bethlehem Steel Co., Bethlehem, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

SAWS (Masonry)

Clipper Mfg. Co., 4039 Manchester, St. Louis, Mo.

SCALING HAMMERS

Dayton Pneumatic Tool Co., Dayton 1, O.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keller Tool Company, Grand Haven, Mich.
Schramm, Inc., West Chester, Pa.

SCHOOLS (Correspondence)

McLain's System, Inc., 236 E. Worth St., Milwaukee 12, Wis.

SCREENS (Shake-Out)

Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Screen Equipment Co., Buffalo, N. Y.
Simplicity Engineering Co., Durand, Mich.

SCREENS (Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Robins Conveyors, Inc., Passaic, N. J.
Screen Equipment Co., Buffalo, N. Y.

SEA COAL

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland 13, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Midwest Foundry Supply Co., Edwardsville, Ill.

SEPARATORS (Abrasive)

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

SEPARATORS (Air, Moisture, Oil)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
American Foundry Equipment Co., 505 S. Byrkit St., Misawaka, Ind.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Johnson Corporation, Three Rivers, Mich.
Jas. A. Murphy & Co., Hamilton, O.
Pangborn Corp., Hagerstown, Md.

SEPARATORS (Magnetic)

Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Dings Magnetic Mfg. Co., E. Smith St., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

SHAKE-OUT MACHINERY

Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Robins Conveyors, Inc., Passaic, N. J.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.

SHOT AND GRIT

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
American Steel Abrasives Co., Galion, O.
Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Cleveland Metal Abrasives Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, O.
Hickman-Williams & Co., Cleveland 14, O.
Pangborn Corp., Hagerstown, Md.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Steel Shot & Grit Co., Inc., 39 Warren Ave., Boston, Mass.
Western Metal Abrasive Co., 2545 East 79th St., Cleveland 4, Ohio.

SHOT (Peening)

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Steel Abrasives Co., Galion, O.

SHOT (Peening) (Cont'd.)

Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, Ohio.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
Steel Shot & Grit Co., Inc., 39 Warren Ave., Boston, Mass.
Western Metal Abrasive Co., 2545 E. 79th St., Cleveland 4, O.

SHOVELS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Wood Shovel & Tool Co., Piqua, O.

SHOVELS (Power)

Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

SILICA FLOUR

Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.

SILICON (Briquets)

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

SILICON CARBIDE (Briquets)

Carborundum Co., Perth Amboy, N. J.

SILVERY PIG IRON see **Pig Iron (Silvery)**

SKIMMER BARS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

SKIMMERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

SKIP HOISTS

Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

SLIP FLASKS

Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

SLIP JACKETS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

SMELTERS & REFINERS

American Smelting & Refining Co., 120 Broadway, New York 5.
Niagara Falls Smelting & Refining Corp., 2304 Elmwood Ave., Buffalo 17, New York.

SNAGGING WHEELS—See **ABRASIVE WHEELS**

SNAP FLASKS

Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

SODA ASH

Hercules Powder Co., 999 Market St., Wilmington 99, Del.
Mathieson Alkali Works, Inc., 60 E. 42nd St., New York 17, N. Y.

SOLDER

American Smelting & Refining Co., 120 Broadway, New York 5.

SPECIAL FOUNDRY ALLOYS

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

SPIEGELEISEN

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

SPRAY GUNS

Murphy & Co., Jas. A., Hamilton, O.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

SPRUE CUTTERS

Freeman Supply Co., Toledo 5, O.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.

STEEL (High Speed)

Bethlehem Steel Co., Bethlehem, Pa.

STEEL (Structural)

American Bridge Co., Pittsburgh 19, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

STORAGE BATTERIES (Industrial)

Philco Storage Battery Div., Philco Corporation, Trenton, N. J.

STRIPPING MACHINES

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

SURFACE TREATMENT METALS

N. Ransohoff, Inc., 208 W. 71st St., Cincinnati 16, O.

TAPER PINS

Standard Horse Nail Corp., New Brighton, Pa.

TEMPERATURE CONTROLLERS

Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

TESTING LABORATORIES

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

THERMOCOUPLES

Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

TIERING MACHINES (Power)

Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

TIMERS (Electric)

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN

American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

TONGS

Industrial Equipment Co., Minster, O.

TOOLS (Pneumatic Portable)

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Dayton Pneumatic Tool Co., Dayton 1, O.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Keller Tool Co., Grand Haven, Mich.
Schramm Inc., West Chester, Pa.

TORCHES and BURNERS

(Acetylene, gas, oil)

Freeman Supply Co., Toledo 5, O.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

TOTE BOXES

Cleveland Wire Spring Co., 1781 East 38th St., Cleveland 14, Ohio.

TRACTORS (Gas Powered)

Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

TRAMRAIL SYSTEMS

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Chicago Tramrail Co., 2910 Carroll Ave., Chicago 12, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

TRAPS (Steam)

Johnson Corporation, Three Rivers, Mich.

TROLLEYS

Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Modern Equipment Co., Port Washington, Wis.

TRUCK BATTERIES (Industrial)

Philco Storage Battery Div., Philco Corporation, Trenton, N. J.

TRUCK CRANES

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland, O.

TRUCKS (Electric-Industrial)

Automatic Transportation Co., 121 West 87th St., Chicago 20, Ill.
Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland, O.

TRUCKS (Motorized Hand Lift)

Automatic Transportation Co., 121 West 87th St., Chicago 20, Ill.

TRUCKS (Power Lift)

Automatic Transportation Co., 121 West 87th St., Chicago 20, Ill.
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland, Ohio.
Lift Trucks Inc., 2425 Spring Grove Ave., Cincinnati 14, Ohio.

TRUCK WHEELS

Bethlehem Steel Co., Bethlehem, Pa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TUMBLING BARRELS

Cleveland Chaplet & Mfg. Co., 1197 West 67th St., Cleveland 2, O.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati 16, O.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corporation, 15707 Lathrop Ave., Harvey, Ill.

TURNTABLES

Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Foundry Equipment, Inc., 100 Grand St., Coldwater, Mich.
Modern Equipment Co., Port Washington, Wis.
Whiting Corporation, 15707 Lathrop Ave., Harvey, Ill.

VACUUM CLEANERS

Allen Billmyre Co., Mamaroneck, N. Y.

VALVES (Air, Water, Steam)

Air-Way Pump & Equipment Co., 405 S. Jefferson St., Chicago 7, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

VALVES (Adjustable Orifice)

North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

VALVES (Blow-off and Cut-off)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Wm. H. Nicholls Co., Richmond Hill, Long Island 18, N. Y.

VENTILATING SYSTEMS

American Foundry Equipment Co., 565 S. Byrkit St., Mishawaka, Ind.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Co., Cleveland 4, O.
Peters-Dalton Inc., 17900 Ryan Rd., Detroit 12, Mich.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

VENTS (Core Box)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Demmler & Bros., Wm., Kewanee, Ill.
Reinacher Industries, 2035 Hilton Rd., Ferndale, Mich.
C. M. Smillie & Co., 1100 Woodward Hgts. Blvd., Ferndale, Mich.

VIBRATORS

Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Davenport Machine & Foundry Co., Davenport, Iowa.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Martin Engineering Co., Kewanee, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Nicholls Co., Wm. H., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Syntron Company, Homer City, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

VIBRATORS (Core Bench)

Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.

WASH ROOM EQUIPMENT

Bradley Washfountain Co., 2217 W. Michigan St., Milwaukee, Wis.

WAX (Core, Vent, Pattern)

Kirdl-Collins Co., 1653 Elmwood Ave., Cleveland 11, Ohio.
United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

WEDGES (Foundry)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WELDING GAS

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

WELDING (Acetylene Generators)

Sight Feed Generator Co., Richmond, Ind.

WELDING APPARATUS (Electric Arc)

Sight Feed Generator Co., Richmond, Ind.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

WELDING and CUTTING APPARATUS and SUPPLIES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

WELDING ELECTRODES (Carbon)

National Carbon Co., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

WELDING RODS & ELECTRODES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
American Agile Corp., 5806 Hough Ave., Cleveland 3, O.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

WHEELBARROWS

Construction Machinery Corp., Waterloo, Iowa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS (Cut-off)

West Co., Inc., 1117 Shackamaxon St., Philadelphia 25, Pa.

WHEELS (Wire)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE BRUSHES

Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE NAILS

Bethlehem Steel Co., Bethlehem, Pa.
Republic Steel Corp., Cleveland 4, O.

WOODWORKING MACHINERY

Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Kindl-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

X-RAY FILMS

Eastman Kodak Co., Rochester, N. Y.

X-RAY INSPECTION

Magnaflux Corporation, 5910 Northwest Highway, Chicago 41, Ill.

ZINC

American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

Classified Advertising

Help Wanted

FOUNDRY SUPERINTENDENT

Wanted by 125 ton daily capacity gray iron foundry in Cleveland, Ohio. The man we are seeking must be a practical foundry man capable of taking complete charge of the production of light weight cored castings. An unusual opportunity and substantial salary awaits the man who can assume full responsibility for operations from the time raw materials are received until finished castings are shipped. Send complete details of qualifications to obtain interview.

BOX 521

THE FOUNDRY CLEVELAND 13, OHIO.

SALES REPRESENTATIVE WANTED

A prominent firm engaged in the manufacture of melting furnaces, both cast iron and nonferrous, desires to make contact with high grade live wire organizations or individuals now covering the following territories and contacting the foundry industry.

Cleveland
Boston
Cincinnati
Kansas City
San Francisco
Denver

Interested parties should write stating territories covered, how long, and lines now being handled.

BOX 490

THE FOUNDRY CLEVELAND 13, OHIO

GENERAL FOUNDRY FOREMAN

Malleable Iron Foundry needs a man with sufficient experience and ability to handle help and to take charge of our Molding, Core Room and Melting operations.

FRAZER & JONES COMPANY

SYRACUSE 1, NEW YORK

DISTRIBUTOR

Of proven ability for the West Coast States who is currently soliciting the foundry trade to handle nationally advertised core oils, synthetic resin core binders and a core wash. Address: Box 537, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

GENERAL FOREMAN
FOR
GRAY IRON FOUNDRY

Must be familiar with Cupola practice. Must have practical knowledge of sand specifications and mixing. Must have thorough knowledge of making Cast Iron Soil Pipe by centrifugal cast method. We have soil pipe machine in operation but not in production. Foreman must be able of organizing and getting this department into mass production. Good living conditions. Good salary plus bonus on production basis. State age and experience. Write fully. Address: Box 660, San Antonio, Texas.

PATTERNMAKER AND ENGINEER

A large Production Foundry making Gray Iron and Steel Castings requires the services of a person experienced in the construction of patterns and all phases of pattern work. Must be very familiar with operation of foundries. State age, experience and salary wanted. Address: Box 520, The FOUNDRY, Cleveland 13, Ohio.

MANUFACTURER'S AGENT

National manufacturer has established territories for foundry salesmen. Orders repeat continually. No objection to non-conflicting lines. Excellent earnings. Reply fully in confidence. Address: Box 483, The FOUNDRY, Cleveland 13, Ohio.

FACTORY MANAGER

Wanted for a medium-sized concern, manufacturing strip-steel and wire-grip products. Want experienced man, thoroughly capable of taking complete charge of plant operation; having full knowledge of production, tooling and streamlining plant operation. Give full details: personal history, qualifications, past experience, salary requirements. References held confidential, if requested. Address: Box 460, The FOUNDRY, Cleveland 13, Ohio.

FACTORY ENGINEER

Sixty-three year old Ohio manufacturing concern seeks services of Engineer with gray iron foundry experience, to study methods, all controls with object of assuming substantial management responsibility as soon as qualified. Energy, common sense and ability to get along with others are essential. Excellent opportunity. State age, education, experience and salary desired. Include recent snap shot or photograph, which will be returned. Address: Box 412, The FOUNDRY, Cleveland 13, Ohio.

REPRESENTATIVES

Leading manufacturer of core oils and other products requires two first class representatives to cover middle west territory. Preference given those having an established following in core oil and who are able to demonstrate and sell it. Reply fully in strict confidence stating age, experience, salary and or commission desired. Address: Box 481, The FOUNDRY, Cleveland 13, Ohio.

ENGINEER OR TECHNICIAN

São Paulo, Brazil foundry desires to contract engineer or technician with thorough knowledge of nonferrous centrifugal casting. Preference (not condition) American, Swiss, Dutch, German, Swede, age 35-45, married. References. Reply to: Fredrick Deppendorf, Gresskill, N. J.

GENERAL FOREMAN

Medium sized grey iron foundry in middle west wants man with practical experience on general jobbing and machine molding. Castings from less than one pound to five ton. Must have ability to handle men and thoroughly understand rigging. Give age, experience, salary desired and when available. Address: Box 333, The FOUNDRY, Cleveland 13, Ohio.

DISTRIBUTOR

Wanted—A distributor of proven ability for the New England States soliciting the foundry trade to handle nationally advertised core oils, synthetic resin core binders and a core wash. Address: Box 526, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRY SUPERINTENDENT

Experienced in mechanized foundry setup. Excellent opportunity in new mechanized grey iron foundry located in West central Michigan. Production twenty tons daily and will expand to forty tons daily. Person selected will have opportunity of choosing own key personnel. Excellent salary and incentive sharing plan. Address all inquiries stating age, education, experience, etc. to:

ASSOCIATED ENGINEERS, INC.

230 EAST BERRY STREET

FORT WAYNE, INDIANA

GENERAL SUPERINTENDENT

A Production Foundry in the Middle West, producing Iron and Steel Castings, wishes to employ a General Superintendent. To qualify applicant must have had large experience in Ferrous Foundries. State age, experience and wages desired. Address Box 519, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPPLY JOBBERS—ATTENTION

Established manufacturer of air tool products with complete foundry line of air tools requires wider distribution for their products. If you are at present selling to foundries, please communicate with us. Address: Box 405, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY FOREMAN

A working foreman to assist Foundry Superintendent in a well equipped production brass foundry; good opportunity for a hustler. State age, experience and salary desired in first letter. Address: Box 192, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Excellent opportunity in Midsouth for man experienced in continuous production foundry making internal pressure castings. State experience, education, age, etc. Address: Box 511, The FOUNDRY, Cleveland 13, Ohio.

ALUMINUM OPEN HEARTH OPERATOR

Secondary nonferrous refiners. Midwestern Region. State experience, qualifications, references and wages desired in first letter. Address: Box 307, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

In Southern Ohio foundry. Thoroughly experienced on brass, bronze and aluminum machine production and floor work. Includes core and pattern departments, all capably manned by experienced foremen. Some jobbing casting work, although mostly for manufacturing division of same company. Long established, reliable, progressive plant. Excellent opportunity for good aggressive man. State full qualifications for interview to follow. Replies confidential. ADDRESS BOX 522, THE FOUNDRY, CLEVELAND 13, OHIO.

Classified Advertising

Help Wanted

GENERAL FOUNDRY FOREMAN

An Eastern Pennsylvania Foundry is looking for a general foundry foreman with practical experience in grey iron production molding. Must be able to handle men, rig patterns and achieve quality production. Good chance for advancement for the hustler. State age and experience in detail, also salary desired. Address: Box 532, The FOUNDRY, Cleveland 13, Ohio.

CUPOLA OPERATOR

Mansfield, Ohio gray iron foundry requires services of thoroughly trained person to have complete charge of cupola department. Excellent opportunity for right man. Permanent position. State age, education, experience in detail and give references. Address: Box 536, The FOUNDRY, Cleveland 13, Ohio.

WANTED

SALESMEN or MANUFACTURERS' AGENTS
Now calling on foundries and forgings companies to handle complete line of Missouri refractories. Write in detail giving territories now covered, products handled, qualifications, etc. Address: Sales Manager, Chicago Fire Brick Company, 1467 Elston Ave., Chicago 22, Ill.

PNEUMATIC TOOLS — FACTORY REPRESENTATIVES WITH SALES AND SERVICE ENGINEERING EXPERIENCE

Old established manufacturer of pneumatic tools, now with expanded line of products is desirous of obtaining Factory Representatives. Give complete record of experience. Address: Box 138, The FOUNDRY, Cleveland 13, Ohio.

SALES REPRESENTATIVES

Men at present selling foundries in Ohio, Indiana, Michigan, Illinois and Iowa wanted to handle brass, bronze and aluminum ingot and other foundry supplies. Address: Box 545, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

For complete charge of aluminum department in plant in Chicago area making secondary aluminum ingot. Address: Box 477, The FOUNDRY, Cleveland 13, Ohio.

BRASS OPEN HEARTH OPERATOR

Secondary nonferrous refiners. Midwestern Region. State experience, qualifications, references and wages desired in first letter. Address: Box 306, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Excellent opportunity for dry process sanitary ware plant superintendent to construct and operate plant in South American country. Must have complete knowledge of foundry operation (sand slinger method), patterns, sand blasts, enamel shop and plant management. Address: Box 543, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Excellent opportunity for man to take complete charge as general manager of an established brass and bronze ingot smelting plant. State background and experience. Must have executive ability. Address: Box 534, The FOUNDRY, Cleveland 13, Ohio.

WORKING FOREMAN

In small foundry, old established firm on West Coast manufacturing marine propellers and allied parts of manganese bronze. Give age, experience, salary expected. Good opportunity for right man. Address: Box 509, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

To take charge of Grey Iron foundry producing machinery castings, employing 50 men. Must be experienced on molding machines, cupola practice and core room. Good opportunity for a hustler. Address: Box 549, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Malleable iron experience preferred. Permanent position with an established concern. Address: Box 514, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

SUPERINTENDENT

Foundry located in Colorado desires Superintendent experienced in gray iron and bronze. Prepared to offer good proposition to capable man. Address: Box 506, The FOUNDRY, Cleveland 13, Ohio.

Employment Service

GRAY IRON FOUNDRY EMPLOYMENT

We are receiving many inquiries for superintendents, metallurgists and foremen. We shall be glad to hear from qualified men. No charge
Gray Iron Founders' Society Inc.
1010 Public Square Building Cleveland, Ohio

SALARIED POSITIONS
$2,500-$25,000

This thoroughly organized confidential service of 36 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.
R. W. BIXBY, INC.
101 Dun Bldg. Buffalo 2, N. Y.

Positions Wanted

HOW TO SELL THE CHICAGO AND MIDDLE WESTERN MARKET

Live wire sales representative with 15 years' successful background, available to a manufacturer of Malleable and Cast Iron Pipe Fittings, Steel Pipe Nipples, Cast Iron Soil Pipe or Copper Tubing and Brass Pipe. I have orders on hand, also a very broad acquaintance with key buyers of, and major users of, these products in this territory, and by my sound sales plan will assure maximum results. If your company has these meritorious products and is deserving of optimum sales distribution, it will pay you to consider strongly my comprehensive sales-representation for your coverage of this territory. Can give you a minimum guarantee of set dollar volume or you need not pay me one penny commission if I fail to meet quota during 90 day trial period. Write or wire.
BOX 407
THE FOUNDRY CLEVELAND 13, OHIO

SUPERINTENDENT OR ASSISTANT

Twenty-one years' practical foundry experience. Eleven years' molding, ten as supervisor, foreman, superintendent of gray iron, semisteel and alloy shops. Experienced in rigging and gating for fast production and quality. Also mixtures of facing and cupola practice. Age 43, high school education, member AFA, good references. Address: Box 485, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Thirty years of age, 12 years' experience as a molder in iron and aluminum and small experience in nonferrous metal desires position as foreman or superintendent. Experienced in heavy machine tools up to 15 tons. Also valve, locomotive, aeronautical and general jobbing castings. Experienced in green sand and dry sand molding, core making and melting. A McLain graduate. Also a veteran of World War II. Will go anywhere with an assured future. Address: Box 470, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Gray iron foundry executive. Sound background and experience in all foundry procedure. Ability to achieve quality production. Practical and technical with all phases of foundry operations. Molding, coremaking, cupola operation, melting, metallurgy, costs, sales and contracts. Experienced trouble shooter between foundry laboratory, machine and pattern shop. Good rigger for production. In present connection years of experience as foundry superintendent with the responsibilities of a foundry manager. Address: Box 312, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

EQUIPMENT SALES ENGINEER IN CHICAGO

Wishes to establish full time connection in foundry equipment field. Understands foundry requirements, experienced in survey work to determine operating results of new equipment and can do field layout work. Now employed but wishes to make change. Territory desired—Central States. Financial and business record the best. Address. Box 540, The FOUNDRY, Cleveland 13, Ohio.

PERMANENT MOLD ENGINEER OR FOUNDRY SUPERINTENDENT

Practical and technical nonferrous foundryman. Practical designer, estimator, foundry manager, metallurgist, molder, coremaker and inspector. Many years' experience training labor in foundry practice. Available immediately. Address: Box 466, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Wide experience, 24 years in full charge of foundries. Practical molder and core maker. Medium and heavy high grade machinery and jobbing castings, gray iron and semi-steel, green and dry sand. Well versed in metallurgy. Address: Box 550, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN OR SUPERINTENDENT

Wants charge of gray iron jobbing shop. Practical experience on green dry sand light and heavy castings. Cupola practice. Sixteen years as foundry foreman. Address: Box 397, The FOUNDRY, Cleveland 13, Ohio.

SALES ENGINEER

Graduate engineer, 37 years old, with pleasing personality, wishes to represent in New York State, Pennsylvania, and Northeastern Ohio, a sound company needing metallurgical and engineering service for its customers. Headquarters would be in Western New York. Have had 15 years' experience in executive positions. Very well known in the Gasoline and Diesel Engine business. Authority on ferrous and nonferrous metals, and on design of motor castings and forgings. Can estimate costs from blueprints; can design construction of pattern equipment from blueprints. Know the foundry and machine shop business from the ground floor up. Am active member of the Society of Automotive Engineers, the American Foundrymen's Association, the Americon Society for Metals, the Institute of Radio Engineers, the Engineering Society of Buffalo. Would be glad to have interview with you at your convenience. ADDRESS: BOX 504, THE FOUNDRY, CLEVELAND 13, OHIO.

METALLURGIST FOUNDRY SUPERINTENDENT CHEMIST

College graduate, 32, 12 years' ferrous and nonferrous experience in large production and jobbing foundries as chemist, metallurgist and assistant superintendent, manufacturing quality castings acceptable to the Aircraft Industry, is available for superintendent's position with established, progressive company that considers technical background an essential prerequisite. Salary $7,000 to $8,000. Address: Box 505, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT

McLain Graduate of Milwaukee. Practical foundryman with many years' experience in Gray Iron Cupola or Electric Furnace and nonferrous metals—light, medium and heavy castings. Understand foundry from molding, core room, grinding room to shipping room. A-1 foundryman. Age 44 with best references. Employed as foundry superintendent. Address: Box 339, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Foundry metallurgist with seventeen years' experience as metallurgist and foreman in large automotive gray iron and malleable foundries desires position in medium sized gray iron foundry in northern Ohio or Michigan. Wide experience in all branches of foundry work. Technical training. Best of references. Address: Box 491, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Positions Wanted

ATTENTION MANUFACTURERS

Government Sales Representative with offices in Washington, D. C. and with products on General Schedule of Supplies is desirous of adding another item to his line. Sales record and background will stand rigid investigation. Address: Box 554, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Now employed wishes to make a change. Has had years of experience. Unusual background of experience both in the foundry and the completion of the product. Have excellent reputation for developing new methods. Forty-one years of age, married and family. Address: Box 330, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY FOREMAN

Capable man 33 years old. Eleven years' experience in dry and green sand. Foreman on pattern making and foundry. Experience with yellow brass, bronze, aluminum and manganese bronze. Address: Box 507, The FOUNDRY, Cleveland 13, Ohio.

SALES ENGINEER (Midwest)

Wide acquaintance among all classes of foundries in Middle Western States. Familiar with foundry practices, problems and equipment. Desire additional sales lines or line for full time employment. Headquarters Chicago. Member AFA. Financial responsibility, business integrity unquestioned. Address: Box 541, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY FOREMAN

Practical experience on high grade work including chandelier castings, grave markers, ornamental bronze, hardware, steam valves, jobbing and production work. Prefer position with manufacturing plant. Address: Box 472, The FOUNDRY, Cleveland 13, Ohio.

AGGRESSIVE FOUNDRYMAN

Young, aggressive foundryman desires executive, engineering or sales position with progressive foundry or foundry supplier. Technical school graduate with eight years' experience in gray iron, malleable and steel. Supervisory experience in molding, coremaking, sand control and foundry engineering. Address: Box 539, The FOUNDRY, Cleveland 13, Ohio.

FOREMAN

What have you to offer young man with twelve years' experience in molding, core work and foremanship in all types of metals. Address: Box 524, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales, finance and production. Excellent experience machinery, tool, foundry and related lines. Address: Box 445, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Twelve years' experience as chemist, metallurgist gray iron jobbing foundries. Know melting, pouring, gating, risering sand control, molding practice for machine tool and pressure castings up to 25 tons. Desire midwest location. Address: Box 538, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY FOREMAN

25 years' experience on high grade pressure castings, green and dry sand, French sand, ornamental tablet and false core work. Address: Box 535, The FOUNDRY, 16 E. 43rd St., New York 17, N. Y.

SUPERINTENDENT OR GENERAL FOREMAN

Steel or high alloy, practical and technical experience. Good rigger for jobbing or machine production. A good handler of men and can get production from all types of labor. Can train new men for molding or coremaking. Will go anywhere. Address: Box 553, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

EXPERIENCED SALES REPRESENTATIVE

Now regularly contacting foundries in Illinois, Wisconsin, Michigan, Indiana. Can give your line excellent representation. Knows foundry trade and enjoys confidence of many customers in both ferrous and nonferrous fields. Address: Box 542, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY PRODUCTION SUPERVISOR

Supervisor of foundry production for 25 years. Special experience in planning and production control. Vicinity of Michigan. Address: Box 863, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thoroughly qualified grey iron practical foundryman. 22 years' experience in all foundry practice. 12 years molding—10 years supervisor. Experienced in rigging and gating for quality production, also on sand slinger and core blower. Mix by analysis. Address: Box 551, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Twenty-five years' broad experience in ferrous metallurgy, mainly cast iron. Now employed. Address: Box 523, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Iron-steel nonferrous. **Up to date.** Practical and technical. Handle **fully any size.** American, age 60. Now located in **the Northwest.** Address: Box 624, The FOUNDRY, **Cleveland 13,** Ohio.

CORE ROOM SUPERINTENDENT

Twenty-five years' experience as superintendent in production and jobbing foundries producing quantity and quality work. Experienced in all phases of core work and machinery, specializing in sand mixing, core baking and blowing machines. Prefer Southwestern States. Address: Box 512, The FOUNDRY, Cleveland 13, Ohio.

METALLURGICAL ENGINEER

Precision casting metallurgical engineer. Wide experience with installation for producing castings. Available on consulting basis or for employment. Address: Box 533, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Gray iron, malleable or steel. McLain graduate. Jobbing or production. **Estimate from blue prints. Light and medium castings. Available immediately.** Address: Box 488, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Fully experienced in nonferrous metals—light, medium and heavy castings. Cores and coreroom work. Twenty years' experience. Age 44. Neat and aggressive. Employed. Address: Box 465, The FOUNDRY, Cleveland 13, Ohio.

METALLURGICAL ENGINEER

Registered. Ten years' experience production and research in iron and nonferrous castings, sand control, heat treatment, material specification and foundry engineering. Wanted location in California. Address: Box 555, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY MANAGER

Has A-1 character and ability. Trained in engineering and metallurgy. MS Degree in metallurgy with many years' steel foundry experience. Address: Box 544, The FOUNDRY, Cleveland 13, Ohio.

ILLINOIS SALES REPRESENTATION

Young practical foundryman with successful sales background desires to enter foundry equipment and supply business covering Illinois. Member of AFA, good personality and excellent foundry references. Financially capable. All correspondence confidential. Address: Box 547, The FOUNDRY, Cleveland 13, Ohio.

IRON FOUNDRY EXECUTIVE

With unusually broad and mature experience in the industry having outgrown present responsibilities, offers aggressive leadership in managing and developing your business. Long and successful record in present connection. Would consider partnership. Address: Box 546, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

PRODUCTION MANAGER

Available for position in plant employing under 200. Twelve years in production work. Age 42, college graduate, married, reliable, conscientious, record of proven ability. Emphasis on planning and scheduling. Write: ALAN F. BISHOP, 451 Pine St., Lockport, N. Y.

FOUNDRY SUPERINTENDENT

Forty years of age with twenty years' experience in grey iron jobbing business. Thoroughly grounded in all phases of foundry practice. Prefer medium casting production, either on squeezer or rollover machine. Address: Box 552, The FOUNDRY, Cleveland 13, Ohio.

Correspondence Course

MIXTURES—MELTING—SEMI-STEEL

Our system in plain foundry terms, 90% applicable to your practice will save you coke, reduce losses and build up human element. Get our report on your cupola, eliminate mysteries, use 10 to 50% steel scrap, depending on section, obtaining a metal more pure, homogeneous, with higher strength. Synopsis free.

MCLAIN'S SYSTEM INC.

230 E. NORTH AVE. MILWAUKEE 12, WIS.

Are **YOU** in need of foundry equipment?
Do **YOU** have equipment to sell?
Are **YOU** looking for experienced men?
Do **YOU** want to obtain a position?
If **"Yes"** is your answer to any of the above questions, may we offer the services of the Classified Advertising Department of The FOUNDRY?

POSITION WANTED

Minimum advertisement set solid, 30 words $1.50. Additional words 5c each.

HELP WANTED

Minimum advertisement set solid, 30 words or less $3.00. Additional words 10c each.

FOR SALE

Minimum advertisement set solid, 30 words or less $3.00. Additional words 10c each.

WANTED

Minimum advertisement set solid, 30 words or less $3.00. Additional words 10c each.

Miscellaneous advertisements such as "Personals", "Services" etc., minimum 30 words set solid, $3.00. Additional words 10c each.

Forms close 13th of month preceding issue

Note: If replies are to be sent to a box number in care of The FOUNDRY, add 6 words to your advertisement for box number and address.

Any advertisement set in all caps, add 50% to above rates.

Classified Advertising

Accounts Wanted

SALES ENGINEERS

Covering the Industrial Trade in the Detroit and Michigan territories over a period of 19 years, desires two good accounts—preferably nationally advertised—castings, forgings, bearings, stampings and machine tools. Thorough knowledge of all phases of merchandising. Best references. Address: Box 513, The FOUNDRY, Cleveland 13, Ohio.

Open Capacity

FOUNDRY CAPACITY OPEN

ALUMINUM PERMANENT MOLD CASTINGS may help get your product to market earlier; may cut machining and finishing costs and increase tensile strength. If you require quantity production in a hurry, it will pay you to send us your prints or sample today for quotation.

FLORIDA DIE CASTING FOUNDRY
131 W. KALEY AVE. ORLANDO, FLA.
PHONE 5215

OPEN CAPACITY

We have open capacity for production work, gray iron castings specializing in match plate work. Facilities for making aluminum match plates. Foundry in central Pennsylvania.

BOX 516
The FOUNDRY CLEVELAND 13, OHIO

CAPACITY AVAILABLE

Open time for 1 ton per day. Brass, Bronze and Aluminum Castings. Address: GREW FOUNDRY COMPANY, 58 WEST WILSON ST., BATAVIA, ILL. PH. 1406.

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample or prints. Address: Oregon Castings Co., R. D. 3, Lititz, Pa.

OPEN CAPACITY

For Aluminum, Brass & Bronze sand castings also equipped with large Lindberg Heat Treat Oven. Address: Box 518, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Foundry to make small gray iron castings. Can give contract for 350 to 500 ton first year. Pattern plates furnished. Address: C. G. S., P. O. Box 31, Oconto, Wis.

Capacity Wanted

FOUNDRY CAPACITY WANTED

Small gray iron castings in large quantities. Steady requirements. Long runs. Address: Box 356, The FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

FOUNDRY FOR SALE

Small foundry doing business for 25 years equipped for iron and brass. "Opportunity". Address: Porterville Foundry, P. O. Box 581, Porterville, Calif.

FOR SALE

Jobbing foundry, capacity in gray iron 3 tons per day; bronze 50,000 lbs. per month. This foundry is fully equipped with modern equipment and now in operation. Large plot of vacant land for dumping or expansion. Owner wants to retire. Location Northern New Jersey, 8 miles from New York City. Address: Box 510, The FOUNDRY, Cleveland 13, Ohio.

Opportunities

FOR SALE

Metal Abrasive Plant now producing both shot and grit. Plenty of business and profit. Consider selling outright or partnership. Address: WM. R. SHIELDS CO., GENERAL MOTORS BLDG., DETROIT 2, MICH.

Opportunities

ALUMINUM
CASTING WORK WANTED

Also jobbing and aluminum match plates made from master patterns. Immediate delivery. Address: C. I. LEE AND SONS, ALUMINUM FOUNDRY, FARLEY, IOWA.

OPPORTUNITY

We can furnish empty tight and slack wooden barrels also steel drums for your products. ADDRESS: BUCKEYE COOPERAGE STATION C.P.O. BOX 1501, CLEVELAND, OHIO.

OPPORTUNITIES

Old established Canadian firm—located 45 miles from Montreal—having Grey Iron Foundry (with Pattern Shop Facilities) and Modern Machine Shop Capacity, interested in adding new products to present lines. Would like to hear from American firms seeking Canadian manufacturer for their products in Canada. Send inquiries to: Box 508, The FOUNDRY, Cleveland 13, Ohio.

PERMANENT MOLDS DESIGNED

Will estimate cost and cycle of mold. Address: THE JOHNSTON PERMANENT MOLD DESIGN CO., 10581 WAYBURN, DETROIT 24, MICH.

FOUNDRY SUPPLIES AND EQUIPMENT

We would like to add additional Foundry Supplies and Equipment lines to our business. Any manufacturer interested in distribution in the Minneapolis and St. Paul, Minnesota area please write: Box 525, The FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

Brass foundry with building, molding and melting facilities (preferably part electric) with current production or possibilities of producing 30 tons monthly. Location Cincinnati area but will consider anywhere in Middle West. Address: Box 344, The FOUNDRY, Cleveland 13, Ohio.

WANTED

2—No. 432 Osborn jolt, rollover, pattern draw molding machines with swingout table.

FRANK FOUNDRIES CORP.
MOLINE, ILLINOIS

WANTED

American Gasoline Sand Cutter same as or similar to Model AA712, size 62". Inside width of wheels, rim to rim 65", outside width 72". Overall width not more than 7' 5", cutting wheel 52". Address: SANITARY CO. OF AMERICA, LINFIELD, PA.

WANTED TO BUY

Snap flasks and jackets both wood and metal, used or new. Send complete detailed list with prices. We have miscellaneous lot of good, used foundry equipment for sale. Write for details and prices. Address: KELLY FOUNDRY & MACHINE CO., P. O. BOX 232, ELKINS, W. VA.

WANTED
FOUNDRY TO RENT

With option to buy. Large enough for ten tons of castings. In New York state or Pennsylvania. Address: Box 530, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

Cupola Blower, 28 to 32 oz. Pressure. Address: Box 527, The FOUNDRY, Cleveland 13, Ohio.

WANTED TO BUY

Complete set of bushing patterns and plug patterns, American standard. Address: Box 531, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Small Foundry, fully equipped. For small gray iron castings. Give full particulars. Address: Box 357, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Used tumbler in good condition app. size 36 x 60. Address: NOBLESVILLE CASTING COMPANY, NOBLESVILLE, INDIANA.

WANTED

Grey Iron Foundry, 12 to 15 thousand square foot area or building suitable for same, with railroad facilities, Michigan or Ohio. Address: Box 548, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY WANTED

We are seeking to buy for cash a foundry equipped to produce gray iron castings up to 10 ton. Will consider smaller foundry if land is available for expansion.

EDWARD H. ZOLL
Industrial Properties Throughout the East
790 Broad St. Newark 2, N. J.
Phone Market 3-4539

For Sale

FOR SALE

(1) Roots-Connersville Cupola Blower, 14 x 36, in excellent condition.

(1) 25 HP Fynn Weichsel Motor and Strating Switch.

(1) No. 6 Whiting Cupola, priced to sell.

BRILLION IRON WORKS, INC.

BRILLION, WISCONSIN

SANDBLASTING EQUIPMENT FOR SALE

Pangborn suction feed cabinets, American Foundry direct pressure cabinet, Sly Tumbling Barrel, Ruemelin Rotary Turntable, Pangborn Dust Collectors, capacities 750-5000 C.F.M., Pangborn sand blasting tanks, capacities 1000-2000 pounds of sand.

CONSOLIDATED ELECTRIC & AIR PUMP CO.
141 MANGIN ST.
NEW YORK 2, N. Y.

FOR SALE

One American Foundry Wheelabrator size 48 x 42. In good condition with spare parts taken out of service due to installation of new tunnel-blast. For further information and specifications call or write:

WEST STEEL CASTING CO.
805 E. 70TH ST.
CLEVELAND, OHIO
EN 4540
MR. K. M. SZEGEDI

REBUILT EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed. All sizes used steel flasks.

HAYNES FOUNDRY EQUIPMENT COMPANY
1734 LAKE ST. KALAMAZOO 21, MICH.

Classified Advertising

For Sale

Rebuilt Equipment in Stock
Immediate Shipment

OVERHEAD ELECTRIC TRAVELING CRANES

	Tons	Make	Span	Current	Remarks
(1)	3	Chesapeake	40'0"	220-VAC.	FL. OP.
(1)	8	Toledo	51'6"	230-VDC.	CG. OP.
(2)	10	Shaw	58'0"	230-VDC.	CG. OP.
(1)	10	Shaw	68'0"	230-VDC.	CG. OP.
(2)	10	P & H	80'0"	230-VDC.	CG. OP.
	(1—10-ton and 1—5-ton trolleys on each bridge)				
(2)	10/5	P & H	80'0"	230-VDC.	CG. OP.
(1)	10	Northern	80'0"	220/440-VAC	CG. OP.
(WITH 2—5-TON TROLLEYS ON THIS BRIDGE)					
(1)	10	Shaw	88'0"	230-VDC.	CG. OP.
(1)	15	Alliance	50'0"	230-VDC.	CG. OP.
(1)	15	Shaw	106'8"	230-VDC.	CG. OP.
(1)	20	Cleveland	50'0"	230-VDC.	CG. OP.
(1)	30/10	P & H	80'0"	230-VDC.	CG. OP.

OUTDOOR RUNWAY
Steel A-Frame 165'0" long each side 25' high

MONORAIL ELECTRIC HOISTS

	Tons	Make	Current	Remarks
(1)	½	Lo-Hed	220-VAC.	FL. OP.
(3)	½	Shepard	230-VDC.	2-motors
(1)	1	Harrington	A.C. or D.C.	FL. OP.
(1)	1	Euclid	110-VDC.	FL. OP.
(4)	1	Shepard	230-VDC.	FL. OP.
(1)	1	Cleveland Tram.	230-VDC.	2-motors
(1)	2	Link-Belt	220-VAC.	geared trolley
(2)	2	Shepard	110-VDC.	FL. OP.
(1)	2	Shepard	230-VDC.	FL. OP.
(1)	3	Shepard	230-VDC.	geared trolley
(1)	5	Shepard	230-VDC.	2-motors
(1)	7½	Shepard	230-VDC.	2-motors
(CG. OP. 40'0" LIFT, HOIST 25/75-FPM., trolley 400-FPM)				

230-VDC. CRANE & MILL MOTORS SERIES

	H.P.	Make	Type	R.P.M.
(1)	2½	G.E.	C.O.-1803 (comp.)	650
(1)	5	Westghse	HK-2	850
(1)	6	G.E.	C.O.-1805	1150
(2)	6¼	Westghse	K-3	680
(1)	7½	Westghse	K-4	750
(1)	7½	G.E.	C.O.-1804	725
(1)	7½10	G.E.	MD-102 (back axle)	1025/800
(1)	9	G.E.	MD-102 (back axle)	975
(1)	12	G.E.	MD-103	875
(1)	15	Westghse	HK-5	700
(2)	15	Westghse	K-6	550
(2)	11/19	C.W.	B.W. (back axle)	675/560
(2)	30/45	G.E.	MD-104½ (comp)	625/500
(4)	35	G.E.	C.O. 1810	500
(1)	30/45	C.W.	Size D.W.	620/520
(2)	42½	Westghse	K-8	910
(1)	50	G.E.	M.D.-105	475
(2)	52	Westghse	K-10 (back axle)	740
(2)	54/80	C.W.	Size F.W.	575/480
(1)	150	Westghse	RNY-96 (comp)	550

Send for our stock list covering 230 V.D.C single and variable speed motors, 220/440 V.A.C std. and slip ring motors, crane controllers and electric brakes. 1 to 1200 HP M.G. sets etc.

SPECIAL

(1)—3-ton Chesapeake 3-motor, CG. OP., 220/-440-VAC. Gantry Crane, 18' 11" bet. legs, 15' 6" overhang each end. REBUILT.

WE OWN AND HAVE ALL THIS EQUIPMENT IN STOCK. IT IS OFFERED REBUILT IN OUR LARGE MODERN PLANT AND FULLY GUARANTEED.

T. B. MACCABE CO.
4304 CLARISSA ST.
PHILADELPHIA (40) PENNA.

REBUILT
BLOWERS—FANS—EXHAUSTERS

Centrifugal blowers for gas and oil burning Sand blast, grinders and dust exhausters Roots-Connersville positive cupola blowers Welding fume exhausters—Ventilating fans.

GENERAL BLOWER CO.
8601 FERRIS AVE.
MORTON GROVE, ILL.

FOR SALE

11 sets 14" dia Round Flasks—New Steel—write for particulars. FOREST HILL FOUNDRY CO., 93 TIFFANY BLVD., NEWARK 4, N. J.

FOR SALE

One No. 7½ Roots low pressure foundry type blower; overhung pulley, top discharge in good running condition. Address: Box 494, The FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

Two Lindberg Electrical Cyclone Tempering Furnaces Type 3336 EH including Quench Tank, Heating Burner, all safety valves, control panels and handling equipment. Like new. For full information write:

GILBERT BRASS FOUNDRY COMPANY
5036 FARLIN AVE.
ST. LOUIS 15, MISSOURI

FOR SALE

Practically new Beardsley & Piper Model 40-103 Sand Muller also bucket elevator. Address: Box 517, The FOUNDRY, Cleveland 13, Ohio.

WIND-UP OF FOUNDRY LIQUIDATION

68—Sterling LT 33" x 39" sections 6", 8", 10".
148—Sterling NT 33" x 38½" sections 8, 10, 12, 14".
2—Whiting BP. Geared Trunion 55" top 55" ht. 48" base.
3—Direct Drive 7½ HP Swing Grinders 20 x 3 x 10".
2—WJ3 Sullivan Angle Compressors. Tanks etc.
1—Rego Oxygen Manifold 16 Tank Type 2122.
3—Bristol Recording Pyrometers. 2 type 440 2000°, 1-340M 600°.
20—Ring Valve No. 2 Chippers. Thor, CP., IR. 11/16" Navy Std.
12—Hand Air Grinders 4500 RPM 5/8" Spindle. CP, IR, Rotor.
8—No. 24 IR. Sand Rammers.
Subject to prior sale.

CUNNINGHAM STEEL FOUNDRY
4200 WEST MARGINAL WAY
SEATTLE 6, WASHINGTON

FOR SALE

Ingersoll-Rand Air Compressor, 50 H.P. motor, size, 11 x 7 x 10. Discharge pressure 90 lbs. per square inch, 250 C.F.M. In good condition. Owner has smaller unit purchased. Price $1,500.00 F.O.B. our plant.

THE WHIPPLE & CHOATE CO.
BRIDGEPORT 1, CONN.

FOR SALE

Molding Machine
49 x 16" International Type "F"
Rollover-jolt-pattern draw
used only 6 months

WAYNE FOUNDRY COMPANY
DETROIT 10, MICH.
TEL. LAFAYETTE 8226

FOR SALE

Type EH-3836 Lindberg Electric Vertical Cyclone Tempering Furnace complete with baskets, controls and panels, timer, etc. ready to install. Substantial discount. This furnace is brand new and never installed. Address: Box 738, The FOUNDRY, Cleveland 13, Ohio.

GOOD USED EQUIPMENT

9' Clearfield Underdriven Wet Pan, self discharging with Morse Silent Chain Drive.
Hassel Safety direct Foundry Swing Grinder Motor 15 HP, 230 volts DC.
Hisey-Wolf Double and Snagging grinder, Motor ball bearing 5 HP, 230 volts DC.

IRA C. JORDAN
2508 EAST BELLEVIEW PLACE
MILWAUKEE 11, WISCONSIN

FOR SALE

Two (2) Cupolas & Blowers. Capacities six (6) and twelve (12) ton per hour. Address: Box 528, The FOUNDRY, Cleveland 13, Ohio.

For Sale

REBUILT EQUIPMENT IN STOCK

Molding Machines
2—International Type F 24" x 10" Stationary Power Jolt, Rollover, and 10" draw.
2—International Type F 26" x 12" Stationary Power Jolt, Rollover, and 10" draw.
2—International Type M 24" x 10" Portable Power Jolt, Hand Rollover and Draw.
1—Osborn No. 450 Stationary Jolt Stripper.
1—Osborn No. 405 Stationary Jolt Rollover with 9" draw cyls.
1—Pridmore Type V Style AV Jolt Rollover Draw 48" x 74" Table 4000 lbs. capacity.
4—Arcade Modern No. 2-38 Portable or Stationary Hand operated Squeeze Rollover Draw with swing out table.
5—Mumford 3" cyl. Core Jolt with 20" x 15" table.
Several plain air squeezers.

Metal Melting Equipment
1—Whiting Style Cupola 41" dia. shell.
New 32" to 41" dia. shell cupolas made to order.
1—Monarch Tilting Iron Pot Aluminum Furnace 100 lbs. cap. Gas or Oil.
2—Hausfeld Tilting Crucible Aluminum Furnaces 33" dia. shell. Gas or Oil.
2—Hausfeld Open Flame Tilting Brass Furnaces 400 lbs. cap. Gas or Oil.
2—Monarch-Rockwell Rotating 500 lbs. brass. Oil.

Blowers for Cupolas and Furnaces
1—6.0 Cu. Ft. per rev. Rotary Blower.
1—19 Cu. Ft. per rev. Rotary Blower.
Maxon-Premix Blower Sets for Gas ⅛ to 1 H.P.
Motor Driven Centrifugal blowers to 2 lbs. press.
Belt Driven Centrifugal blowers for Cupolas.

Tumbling Mills and Sand Blast
1—McLeod 36" x 36" Sand Blast Barrel with Suction sand feed.
1—McLeod 36" x 36" Sand Blast Barrel with bucket sand elevator to press. generating tank.
1—McLeod Sand Blast Generating Tank.
1—McLeod Cloth Screen Dust Collector.
1—Swartwout Car Type Core Oven with Insulated Steel walls, 6½' x 7' x 11' inside dimen. 5' x 6½' Door. Gas Fired. One Car Included.
1—4000 lbs. cap. Worm Geared Crane Ladle.
Air Compressors 1 to 60 H.P.

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7812

FOR SALE

1—Sand Blast Cabinet; Pangborn No. 53, Spec. SBN102.
1—Air Weight Control; for 32" outside diameter Whiting Cupola.
1—Squaring Shears, 14 Ga. Cap., Power Drive, AC Motor, 3 H.P. 60 cycle, 220V, 3 phase, Pexto No. U-272-C, 6 ft. cut.
1—Shaper: 28" with Master A.C. Motor, 7½ H.P., 60 cycle, 3 phase, 220-440V, 1730 R.P.M., Niles-Bennet-Pond, including Swivel Vise 16" x 12".
All Items Practically New.

BOX 515
The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

A well-equipped brass and gray iron foundry. Location Northwestern Ohio. Address: Box 468, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

2—No. 60-80 Stationary Stroman Furnaces—Push Back Cover. Silicon Carbide Lining—Complete with North American Blower and burner equipment. Address: Box 529, The FOUNDRY, Cleveland 13, Ohio.

EQUIPMENT FOR SALE

One Beardsley and Piper sandslinger, stationary type, self contained unit, in good condition. Address: J. O. STEPHENSON FOUNDRY MFG. CO., 420 EAST CADY, NORTHVILLE, MICH. PHONE: NORTHVILLE 888.

Classified Advertising

For Sale

OVERHEAD CRANES

200 Ton Alliance 100′ Span
175 Ton Morgan 54′ Span
150 Ton Whiting 30′ Span
80 Ton "American" 40′6″ Span
75 Ton Alliance 37′ Span
75 Ton Alliance 78′ Span
50 Ton Cleveland 71′10½″ Span
50 Ton Shaw 69′10″ Span
40 Ton Alliance 82′ Span
35 Ton Northern 22′ Span
30 Ton Case 41′ Span
30 Ton Morgan 30′ Span
30 Ton Morgan 77′ Span
30 Ton Niles 53′9″ Span
30 Ton P&H 80′ Span
30 Ton Reading 56′ Span
25 Ton Bedford 50′ Span
25 Ton Cleveland 106′ Span
25 Ton P&H 70′ Span
25 Ton Whiting 106′ Span
25 Ton Whiting 82′ Span
25 Ton Whiting 56′ Span
20 Ton Alliance 77′ Span
20 Ton Cleveland 65′ Span
20 Ton Morgan 77′ Span
20 Ton Northern 60′ Span
20 Ton P&H 39′6″ Span
20 Ton P&H 51′4″ Span
20 Ton Shaw 76′4″ Span
20 Ton Shepard Niles 49′6″ Span
20 Ton Shaw 76′4″ Span
15 Ton Alliance 50′ Span
15 Ton Alliance 35′ Span
15 Ton Cleveland 55′6″ Span
15 Ton Cleveland 35′ Span
15 Ton Morgan 77′ Span
15 Ton Niles 32′ Span
15 Ton Northern 53′ Span
15 Ton Shaw 82′ Span
15 Ton Shaw 77′ Span
15 Ton Toledo 82′ Span
15 Ton Whiting 74′8½″ Span
15 Ton Whiting 71′10½″ Span
12 Ton Morgan 56′ Span
10 Ton Alliance 58′9″ Span
10 Ton Alliance 71′10″ Span
10 Ton "American" 27′ Span
10 Ton Cleveland 38′ Span
10 Ton Cleveland 50′ Span
10 Ton Emsco 30′ Span
10 Ton Lane 50′ Span
10 Ton Morgan 39′5″ Span
10 Ton Morgan 77′ Span
10 Ton P&H 57′ Span
10 Ton P&H 78′ Span
10 Ton P&H 87′6″ Span
10 Ton Northern 34′ Span
10 Ton P&H 48′10½″ Span
10 Ton P&H 60′ Span
10 Ton P&H 80′ Span
10 Ton Shaw 68′ Span
10 Ton Shaw 58′ Span
10 Ton Shaw 88′ Span
10 Ton Northern 71′10½″ Span
7½ Ton Erie 70′ Span
7½ Ton P&H 30′6″ Span
7½ Ton Scullin 71′10½″ Span
7½ Ton Shepard 36′ Span
6 Ton Shaw 23′ Span
5 Ton "American" 10′ Span
5 Ton Champion 37′6″ Span
5 Ton Euclid
5 Ton Milwaukee 39′8″ Span
5 Ton Milwaukee 66′9″ Span
5 Ton Milwaukee 70′ Span
5 Ton Northern 49′6″ Span
5 Ton P&H 45′ Span
5 Ton Shaw-Box 25′ Span
5 Ton Shepard 40′ Span
5 Ton Toledo 96′ Span
5 Ton Whiting 80′ Span
3 Ton P&H 46′4″ Span
3 Ton Shaw 33′ Span
3 Ton Whiting 57′3″ Span
2 Ton Detroit 28′ Span
2 Ton P&H 46′4″ Span
2 Ton Shepard-Niles 18′&14′
1½ Ton Cleveland 25′ Span
1½ Ton P&H 34′ Span
1 Ton Curtis 24′ Span

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Telephones: MUrrayhill 4-2294, 4-2893, 4-2295, 4-2844, 4-2296, 4-8292

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We will inspect surplus equipment for you anywhere in the country, report its condition, specifications, etc. for a moderate fee.

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SCULLY MACHINERY & EQUIPMENT CORP.
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VAN NORMAN INDUCTION HEATER
for laboratory use.
16 K W, input spark gap
Used less than 400 hours.
Excellent condition.

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CORE BLOWER

International Type SB-11 with side clamps, brand new. Uncrated but never used. Immediate shipment. Price $1095.00, F.O.B., Watervliet. ADDRESS WATERVLIET FOUNDRY CO., P. O. BOX 71, WATERVLIET, MICH.

FOR SALE
CORE SAND MIXER

1—Freeman Multi-Blade Mixer 12 cubic feet capacity, Serial No. 7243, New in April, 1944. Ready to run with 7½ HP. 1200 Rpm., 220 Volt, 3 phase 60 cycle motor. Available immediately.

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KING-SEELEY CORPORATION
YPSILANTI, MICHIGAN
ATTEN: MR. E. U. VIELHAUER

FOR SALE

One—No. 9½ Whiting Cupola 7 ft., 6 inch by 45 feet. 18 to 20 ton capacity. Good condition. Dismantled, ready to ship. Address: Ford Donley, 13900 Miles Ave., Cleveland 5, Ohio. Phone WA 6000.

For Sale

1—Pangborn, 4-ft. diameter, type LS, Rotoblast table complete with dust collector, lot of spare parts, all motors and controls. Table fitted with four 20″ diameter auxiliary tables.
2—Marvel #9 high speed saws, complete with motors and starters—10″ x 10″ capacity.
1—R-S Products Co. batch type heat treating furnaces, oil fired, complete with all burners, blower, air filter and furnace controls. Heating chamber 5′-6″ wide x 7′-8″ long. Doors at each end. Hearth above floor.
2—One Allis-Chalmers and one G.E. electric arc furnace transformers, each 1000 KVA, 3 phase, 60 cycles. Primary voltage 13,200. Secondary voltage 160, 150, 140, 130, 120.
1—LeBlond engine lathe 21″ x 8′. Double-backed geared, quick change, tool holder, special face plate, no chuck, tools or steady rest. Equipped with Lima individual drive. Complete with motor and starter.
1—Bethlehem abrasive cut-off machine, series 500, chop stroke style, chain drive, complete with motor and starter.
1—Steel City brinell testing machine, type A-4, clearance between upright standards 3′-8″. Motor operated crosshead and pump. Maximum height of work suitable 51″. Practically brand new.
Lot—Twenty-one (21) high-cycle grinders, 19 either new, factory rebuilt or used, remaining two gearhead missing only. Complete with motor and 32 KW generator for 180 cycle current to supply required current.
1—Berkley centrifugal casting machine, V-belt drive, 24″ table, with motor but no starter.
150—Lyon Metal, style B, metal boxes, size 8½″ x 17½ x 7½. Brand new, never used.
2—Dings #1958-B magnetic pulleys, 12″ diameter x 26″ face, complete with shaft and one pair of pillow blocks.

All items listed are in excellent working condition. Current for all drive motors 220 V, 3 phase, 60 cycles. May be inspected. Subject to prior sale. If interested in any or all items, please write to:

BOX 492
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

2—#815 Johnston & Jennings Rollover Machines
1—#610 " " " " "
2—Herman Rollover Machines
1—Tabor " "
2—Grimes " "
1—Sand Blast Barrel, 36″ x 40″
1—Coombs Electric Riddle
1—Jefferson " "
1—6′ Simpson Sand Muller with loading bucket
2—4′ Sand mixers, new, 2 muller wheels
1—6 x 7 Ingersoll-Rand Air Compressor with tank and motor
1—Kerosene Cupola Lighter
1—Johnston Cut-off Saw
1—Blystone Sand Mixer
1—Automatic Lift Truck with 22 skids
1—Wadsworth stock core machine with motor, ¼″ to 3″ core

Many other items too numerous to mention.

HAYNES FOUNDRY EQUIPMENT CO.
1734 LAKE ST. KALAMAZOO 21, MICH.

CENTRIFUGAL COMPRESSORS AND BLOWERS

2100 CFM GE with 10 HP 3/60/3450 RPM motor.

1200 CFM Buffalo, 9⅓ x 7 x 7¼ with 7½ HP, 220/3/60 1750 motor.
20¼ x 16¼ x 18¼ Allington and Curtis No. 55 (belt drive).

10½ x 10½ American size 5, belt drive.
9 x 9 Buffalo size 4, belt drive.

(2) 8 x 8 Sturtevant size 21061-9 (belt drive).
6 x 6 North American No. 17 with 15 HP 220/3/60 3500 RPM.

150 CFM @ 502, North American 19″ dia. with ¾ HP 3/60/220/440 volt 3500 RPM.

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE. CLEVELAND, OHIO

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And they don't stay friends unless the product lives up to its original promise. They have to be able to depend on its uniformity every time they order it. In other words it has to have integrity. There's no substitute for this when it comes to making friends and keeping them in the Foundry Industry.

The inference in terms of core oil is clear; it means the oils you buy must have certain fundamental qualities, and that these qualities must be maintained—come hell or high water. VELSICOL *light color* CORESIN OILS fulfill this obligation and your foundry benefits in better cores, better castings, and greater profits. Let us submit samples of these *light color* oils suited to your foundry conditions and complete information. Your request incurs no obligation.

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Midwest Foundry Supply Co. EDWARDSVILLE, ILL.
The Foundries Materials Co. HAMMOND, INDIANA
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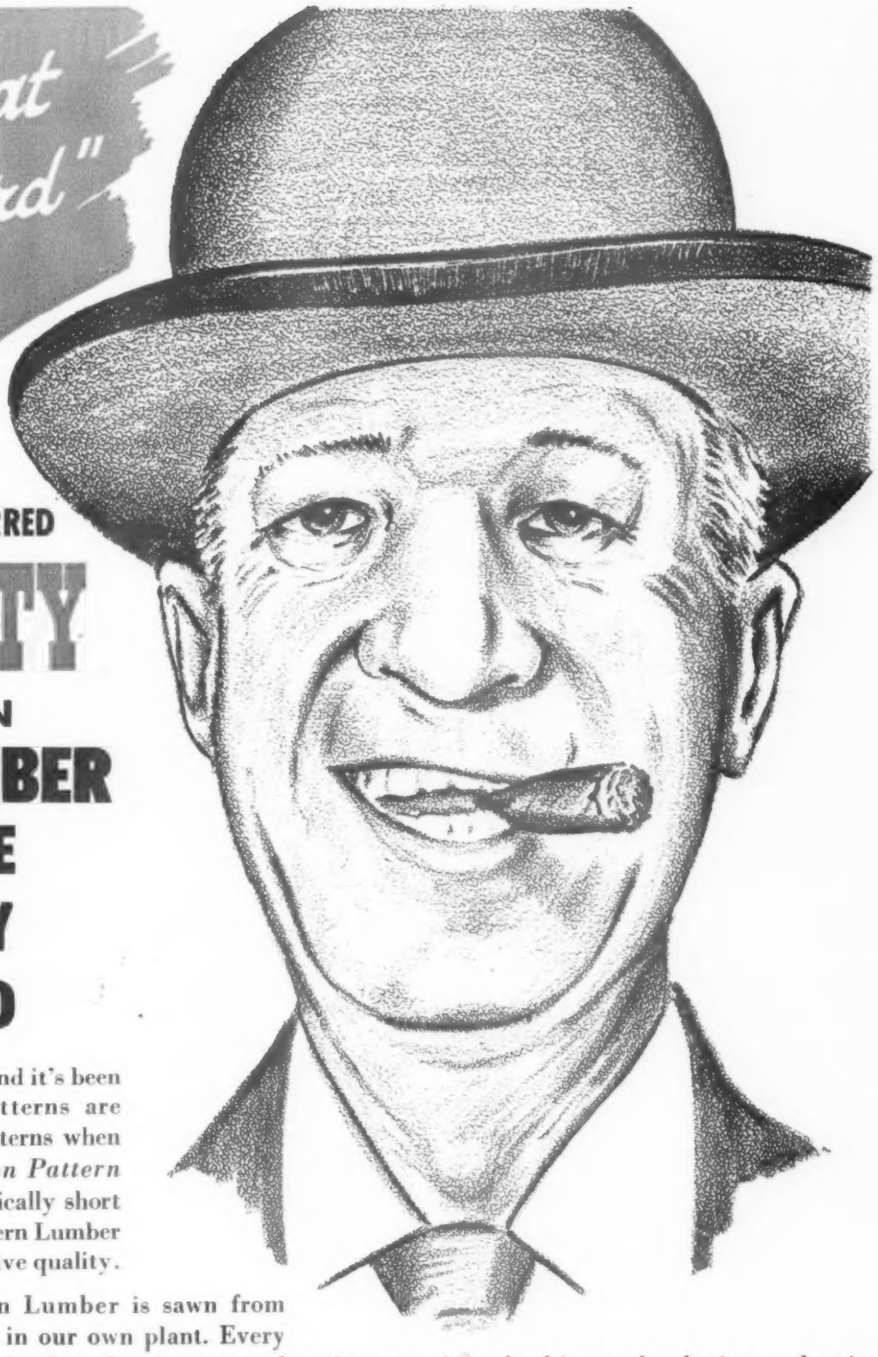

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Cupolas • Cupola Chargers • Lifetime Geared Ladles • Ladles • Electric Cranes
Metal Pouring Systems • Covered & Insulated Ladles • Improved Bottom Pour
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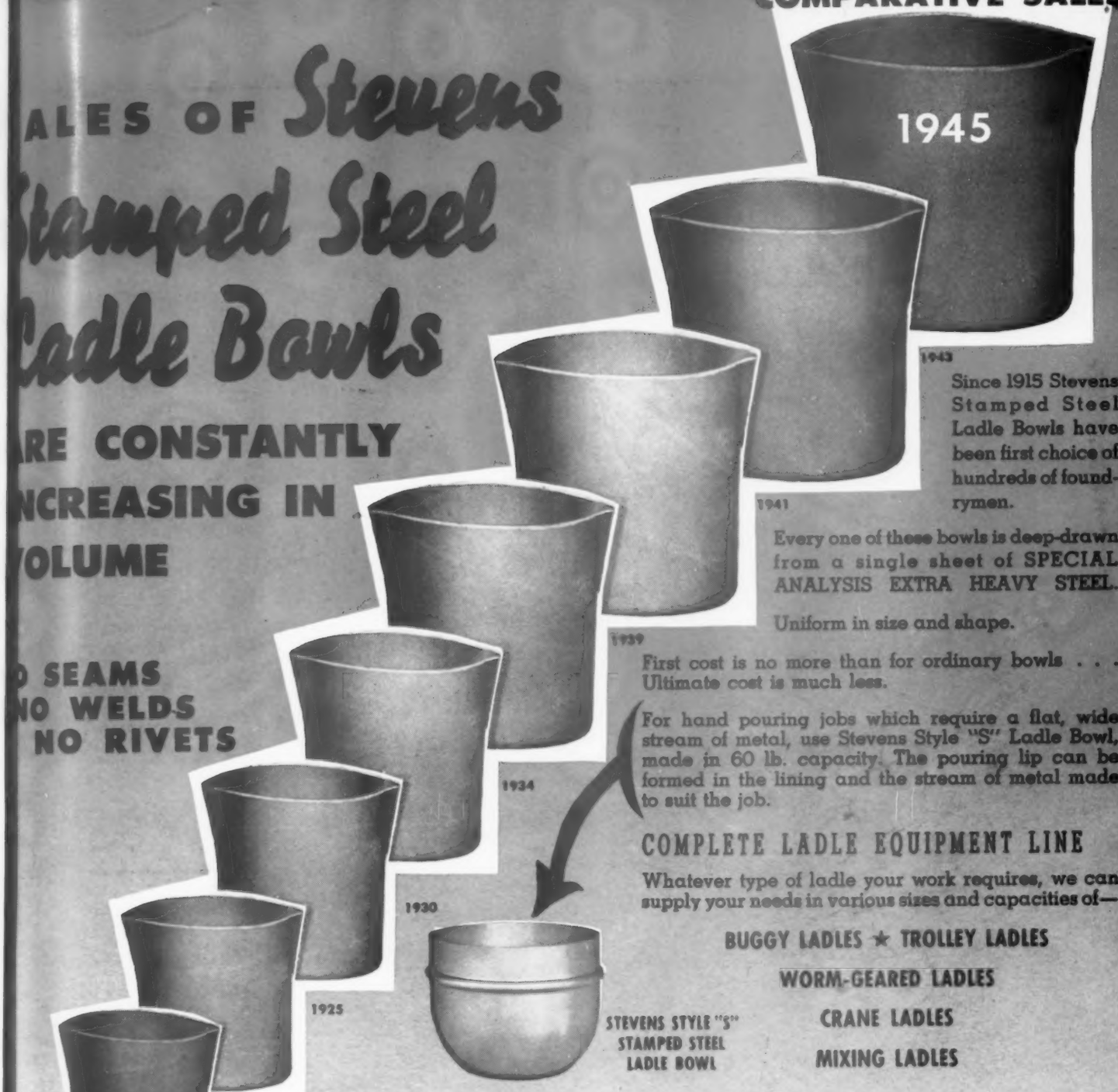
MODERN EQUIPMENT CO.

COMPARATIVE SALES

ALES OF Stevens Stamped Steel Ladle Bowls

RE CONSTANTLY NCREASING IN OLUME

O SEAMS NO WELDS NO RIVETS



Since 1915 Stevens Stamped Steel Ladle Bowls have been first choice of hundreds of foundrymen.

Every one of these bowls is deep-drawn from a single sheet of SPECIAL ANALYSIS EXTRA HEAVY STEEL.

Uniform in size and shape.

First cost is no more than for ordinary bowls . . . Ultimate cost is much less.

For hand pouring jobs which require a flat, wide stream of metal, use Stevens Style "S" Ladle Bowl, made in 60 lb. capacity. The pouring lip can be formed in the lining and the stream of metal made to suit the job.

STEVENS STYLE "S" STAMPED STEEL LADLE BOWL

COMPLETE LADLE EQUIPMENT LINE

Whatever type of ladle your work requires, we can supply your needs in various sizes and capacities of—

BUGGY LADLES ★ TROLLEY LADLES

WORM-GEARED LADLES

CRANE LADLES

MIXING LADLES

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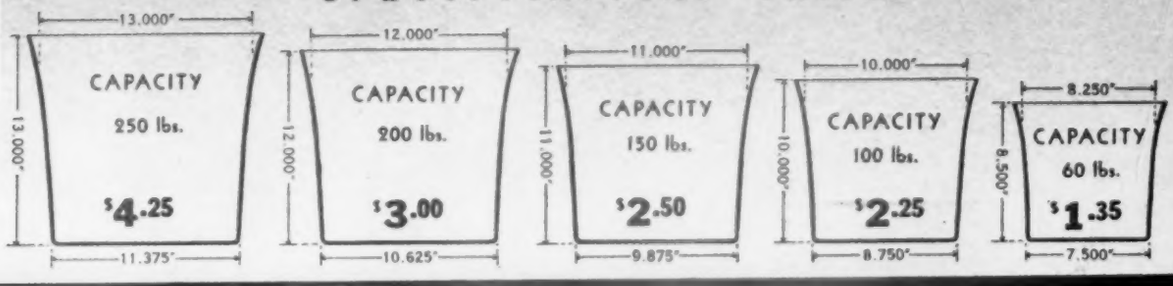

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DETROIT 26 MICHIGAN

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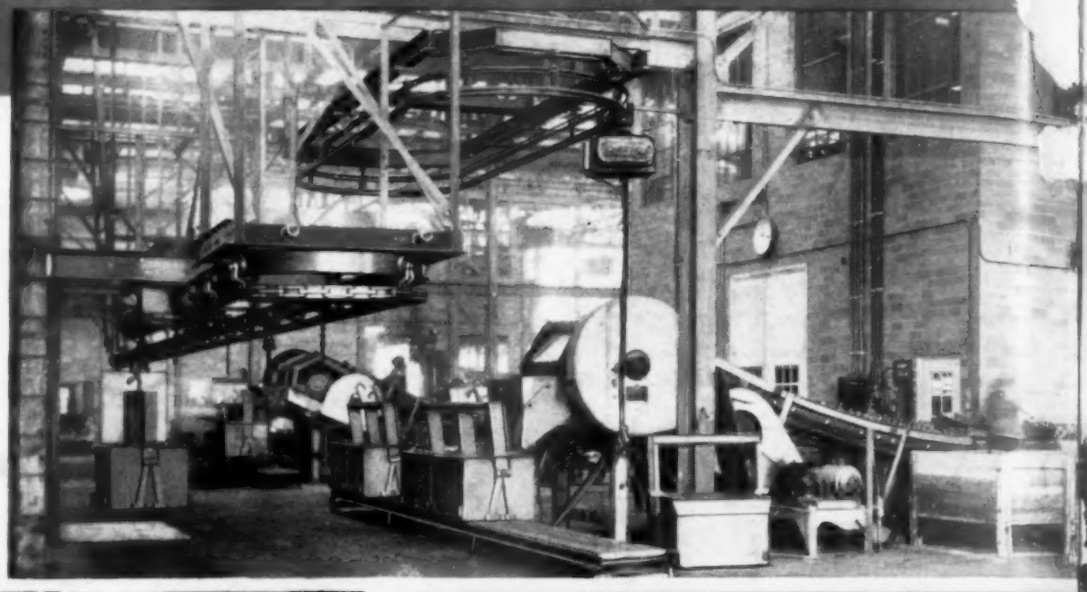
• 1262 McDougall St. . . . . Windsor, Ontario
• 2368 Dundas St., West . . . . . Toronto, Ontario

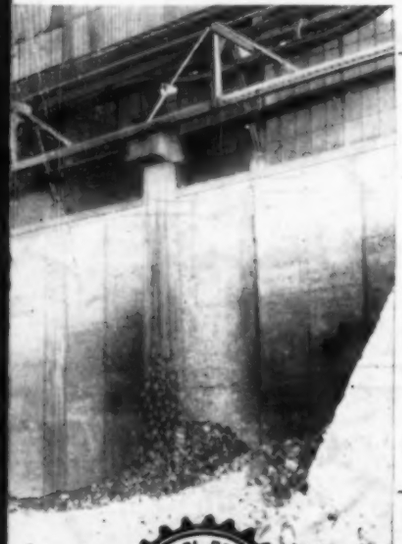
How CASTINGS, MOLDS and SPRUE are Ha... at Lake City Malleable Co.



Castings from the shakeout are carried on two Link-Belt 42" wide channel-top apron conveyors, where after cooling, castings are sprued on the conveyor, sorted and put in containers. These conveyors are rugged and husky — designed and constructed to withstand the hard service that is required of them. The sprue is discharged over the head-ends of these conveyors into trolley conveyor buckets.

Molds. Squeezer molds are placed on this Link-Belt Tru-Trac mold conveyor and conveyed to the pouring zone. They pass through a ventilated cooling enclosure and upon entering the shakeout zone, the mold is automatically discharged to a Link-Belt oscillating-trough conveyor. Bottom boards are retained on the mold conveyor and returned to the molders.

Hot sand and castings as discharged from the poured mol... carried simultaneously, by Link-Belt oscillating-trough convey... Link-Belt shakeout screens where the sand and castings are sepa... The tunnels in which these oscillating conveyors and the shakeo... located, are connected to an air exhaust system.



Sprue. Through a hoisting arrangement, buckets containing the sprue are transferred to an overhead trolley conveyor line and carried by the trolley conveyor through the foundry to the melting area. Here, through a cam arrangement, the sprue is discharged automatically to the sprue pile, shown to the left.

Designed to produce 2,000 tons of malleable iron casting... month, the new foundry of Lake City Malleable Co., Asht... Ohio, is equipped with every modern facility for the produ... of high-grade castings at lowest cost. Daylight illumination... and smoke control, wide aisles, correct spacing of equipmen... a high degree of conveyor-mechanization, provide highly... factory working conditions, and help keep product quality... output up. Modern Link-Belt overhead conveying equipme... handling sprue, apron conveyors for handling castings, Tru... mold conveyors for handling molds, and Link-Belt oscil... conveyors for handling hot sand and castings at this foundry... illustrated above. Let our experienced foundry engineers... you in correctly applying conveying and sand preparation e... ment to meet your specific requirements.

LINK-BELT COMPANY Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

THE SYMBOL OF QUALITY — LB — LINK-BELT

LINK-BELT CONVEYORS

AND PREPARATION MACHINERY

MANUFACTURER'S ASSOCIATION EQUIPMENT